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The OIL AND GAS JOURNAL

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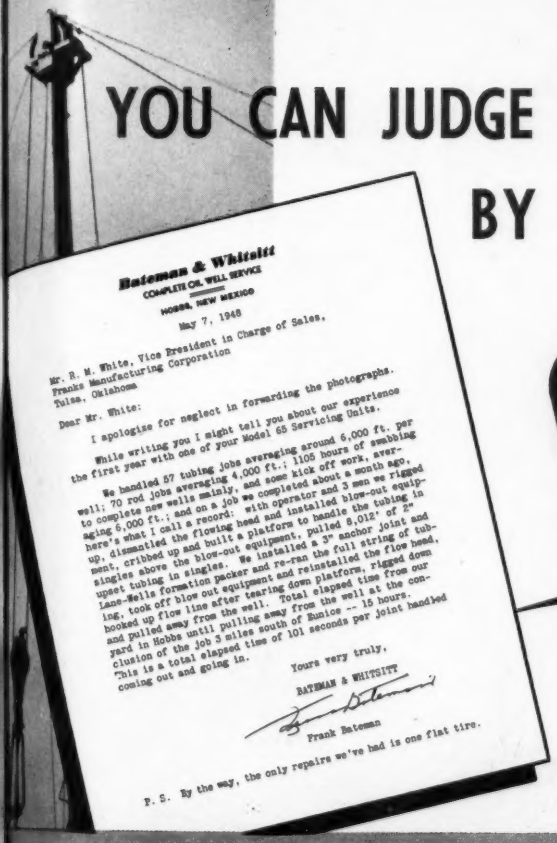

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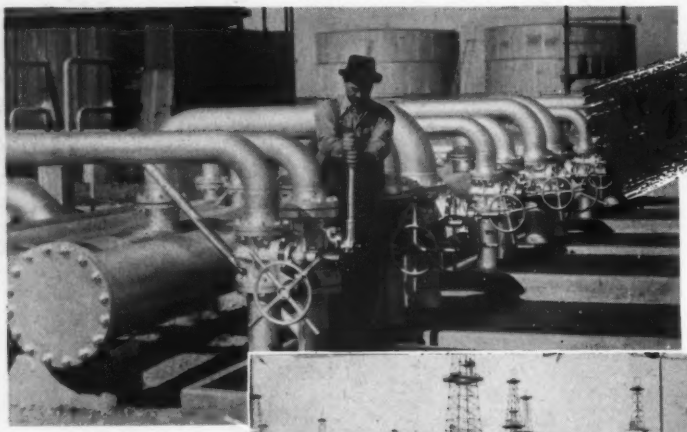

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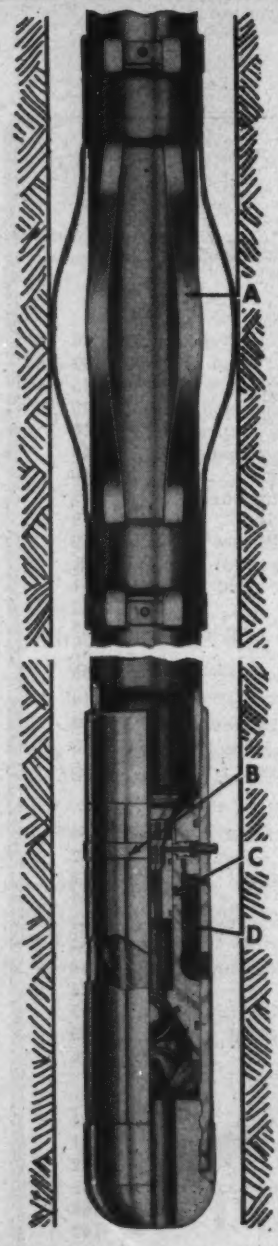

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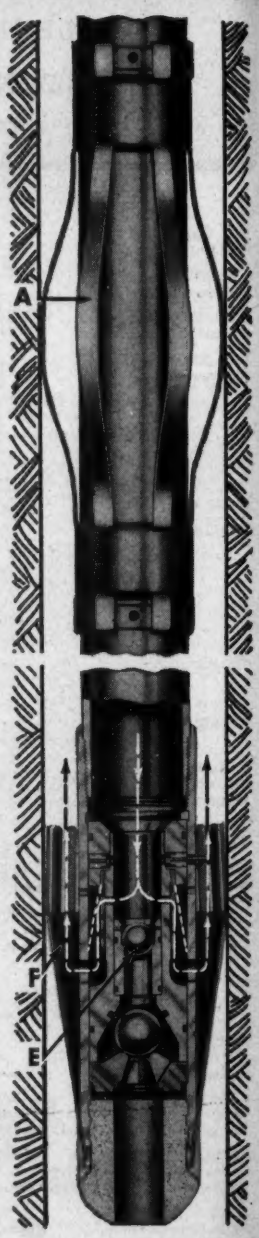

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THE OIL AND GAS JOURNAL

Basing-Point Confusion

THE greatest cause of uncertainty and confusion in industry this week is not the threat of war, labor troubles, high prices, nor shortages of materials, but a thing created by government fiat—the end of the basing-point system of pricing.

It started with cement, but it affects the oil industry, every user of steel, and every seller of a basic commodity. The current confusion and the long-range uncertainties are so great that some manufacturers are talking about moving their plants, while others will seek corrective legislation.

For a quarter century the Federal Trade Commission has been attacking various forms of delivered prices—systems under which a producer quotes prices at or near the point of consumption and absorbs the freight charges. FTC felt that this restrained competition among producers and that consumers would benefit if everything were sold f.o.b. point of production.

Last year FTC ordered the cement industry to abandon its multiple basing-point system. The Supreme Court upheld this in a decision which appears to outlaw every form of zone or delivered pricing. Its mandate took effect July 9. A similar case is pending against the steel industry, but FTC had not intended to make it so sweeping.

United States Steel Corp., faced with the necessity of abandoning basing points for its cement subsidiary, decided to go whole hog in complying with the Supreme Court's interpretation of the antitrust laws and announced that its steel-making subsidiaries also will henceforth sell only f.o.b. mill. Many other steel producers are following suit.

This means that fabricators of oil-industry equipment and other goods located close to mills will get steel at lower prices than competitors at a distance. Historic competitive balance is upset. Sources of supply must be shifted. Few users know with certainty where they will get steel or what it will cost them delivered.

Many petroleum products are sold on what amounts to a zone-price or delivered-price basis. If this is illegal for cement and steel it is illegal for every other commodity. The delicate marketing adjustments among refineries in different geographical locations may be wiped out.

It might take years for production and marketing to stabilize on a universal f.o.b.-mill price system. Some producers and some consumers will benefit from the reshuffle; others will lose. But there is little evidence that the public will be better off when it is all over. There may be inequities in a delivered-price system, but the cure seems worse than the disease.

A government agency, bent on a specific reform, has upset the entire apple cart to get at one apple. This is what happens inevitably when Government attempts to tamper with the play of economic forces and the conditions under which industry has developed.

Louisiana Report Shows Progress In Oil and Gas Conservation

by Dahl M. Duff

LOUISIANA, which in recent years has reduced by 50 per cent the volume of casing-head gas flared, expects a further decrease in gas waste as a result of the rising trend of gas prices, completion of new processing plants, and a public recognition of the need for conservation.

The theme of gas conservation is stressed in several different parts of the newly released eigtheenth biennial report of the Louisiana Department of Conservation. The 128-page report was prepared under the direction of Joseph L. McHugh, who recently resigned as conservation commissioner, and has just been distributed by S. L. Digby, the new commissioner.

In a discussion of conservation progress, the report says: "It must be remembered that several hundred cubic feet of this gas (casing-head) is produced with every barrel of oil, and that as oil production increases, the amount of casing-head gas also increases, presenting an ever greater problem as oil production rises."

However, casing-head gas flaring has been checked despite greater oil production. In December of last year, the oil allowable of 495,000 bbl. daily represented an increase of 21 per cent over the oil allowable of January 1946. Gas flared in December was 221,000,000 cu. ft. daily, an increase of only 2.4 per cent over the amount flared in January 1946.

"Projects in various phases of construction will decrease the amount of gas flared daily by 60,000,000 to 75,000,000 cu. ft.," the report continues. "Planned projects will decrease the number of cubic feet flared still further."

More Funds Requested

McHugh in an introduction to the report says that a proposed proration department to handle natural-gas production and "cure certain evils now present in state-wide natural-gas production" has been shelved due to lack of personnel and funds. Discussing personnel of the department, he declares increased activity during the last 2 years had made additional trained personnel necessary and that to secure them, the state would have to pay salaries in line with those in private industry.

"Great strides have been made in true conservation of Louisiana's mineral resources" in the last 7 years, McHugh says. This is due, he continues, to the excellent conservation law enacted by the legislature in 1940 and to cooperation on the part of the industry, the department, and the general public.

The report contains sections devoted to proration methods used in Louisiana, exploration and drilling activities, the Kerr-McGee Oil Industries, Inc., first distant offshore discovery in Block 32, Terrebonne Parish, a summary of oil and gas production, and to cycling and pressure- maintenance plants.

Louisiana is one of the few states whose laws allow the regulatory agency to enforce unitization under certain conditions, and the report contains another section briefly discussing the legal basis for unitization and some of the methods used. "It appears that unitization, especially of entire newly discovered fields, will play an increasingly important part in oil and gas development," it says. "This will be especially true in the presence of a continued steel shortage, oil shortage, and high prices for oil and gas."

Activity Up Sharply

Other data in the report brought out the following:

During 1946, 1,499 permits to drill were issued, an increase of 24.8 per cent over 1945, and during 1947, number of permits rose to 1,953, and 30.3 per cent increase over 1946.

In 1946, wells completed as producers totaled 752, gas producers 108, and 270 were abandoned as dry. Average footage of these was about 6,150 ft. In 1947, 1,036 wells were completed as oil producers, 105 produced gas, and 485 were dry and abandoned. Average depth was 5,350 ft.

A total of 260 wildcat wells were drilled in 1946, and 278 in 1947. More than 130 were successful, and produced oil or gas from new fields or from major extensions of existing fields. The department issued 644 permits for geophysical exploration during 1946-47. Of these 260 were issued in 1946, and 384 in 1947, indicating the increased interest by operators in offshore as well as in inland water bottoms.

Crude-oil production increased 9.11 per cent to 145,404,369 bbl. in 1946, and increased another 11.17 per cent to 161,647,719 bbl. in 1947. Condensate production decreased 27.07 per cent in 1946 to 4,364,467 bbl., due to more gasoline and cycling plants in operation in 1946. In 1947 production of condensate rose to 4,971,376 bbl., an increase of 13.90 per cent over 1946. Natural-gasoline production in 1946 was 7,367,546 bbl. an increase of 211.28 per cent over 1945, and in 1947 was 7,871,985 bbl., a further increase of 6.85 per cent. Total petroleum production rose 11.74 per cent to 164,914,560 bbl. in 1946, and showed another gain of 12.76 per cent in 1947 to 185,953,692 bbl.

Natural-gas production in Louisiana decreased slightly in 1946, dropping 2.5 per cent to 602,000,000,000 cu. ft. In 1947 production rose 8.18 per cent to 651,000,000,000 cu. ft. Casing-head gas production dropped in 1946 to 167,000,000,000 cu. ft, down 6.45 per cent, but rose in 1947 to 187,000,000,000 cu. ft., a gain of 12.10 per cent.

Offshore Drilling Plans Disclosed by Two Firms

HOUSTON. — Plans for drilling operations by Humble Oil and Refining Co. in two more areas in the Gulf of Mexico off the Texas coast were disclosed last week in requests for Department of the Army construction permits.

Blanket permits authorizing all work necessary to oil development were asked. One location specified is an irregular area of 10,720 acres central to a point about 24 miles southwest from Galveston. The second is a rectangular area 4½ miles wide and 6 miles long central to a point about 10 miles east from Galveston.

In the first area, Humble said work would be carried on in water varying from 28 to 51 ft. Depth of water in the second area is from 14 to 49 ft. Structures on steel piles would be used in both areas, the largest structures being 50 by 150 ft. and connected to converted LSTs with 25-ft. steel walks.

Humble also has made application to the Army Engineers office in New Orleans for another permit for steel-pile drilling platforms and auxiliary structures in an area about 5.6 miles square central to a point about 7½ miles southeast of Grand Isle in Jefferson Parish. Humble has several wells already drilling in the Grand Isle area.

Shell Oil Co., Inc., which has some Louisiana offshore leases and is planning to enter offshore operations, last week made application for authority to make temporary installations of buoys, stakes, detectors,, and other equipment for use in connection with seismograph work in the Gulf of Mexico throughout an area about 104 miles long and extending offshore about 27 miles central to a point about 35 miles southeast from Cameron, La.

Keep Oil-Industry Steel at Home, Committee Chairman Demands

WASHINGTON. — Revision of the administration's export control policy to keep all oil-industry steel in the Western Hemisphere and at least temporarily cut off exports to the Middle East was demanded last week by Chairman Charles A. Wolverton of the House interstate commerce committee.

Wolverton's recommendation followed 2 weeks of hearings by the committee on the steel requirements of the petroleum industry, but he emphasized the study has not gone far enough to enable the committee to make a decision between the conflicting demands of domestic operators that all steel be kept for domestic production and those of the companies operating abroad that such steel should be provided as is required to develop possible foreign sources to build up our imports.

"It does appear clear at this time, however," he said, "that it is somewhat unreasonable to grant export licenses covering large quantities of steel for use in the unsettled Middle East, when such steel could be used advantageously in the Western Hemisphere, both here at home and in Venezuela and Mexico. We have been astounded to find that the Department of Commerce has continued granting licenses for shipments to these critical areas in the Near East while cutting down our oil companies operating in Venezuela to some 25 per cent of their requirements to meet planned expansion of oil production.

Mexican Aid Asked

"With all of the discussion of bringing in greater imports from foreign sources, involving the Middle East and South America, we have been struck with the fact that nothing has been proposed regarding the development of oil resources just across the border in Mexico. This seems a very logical and substantial source of supply. It is known that vast reserves of oil exist in that country. Just what is necessary for their development, and what assistance can be given such a program, has become a matter of prime consideration on the part of the committee. It may well be that in the committee's desire to ascertain and vigorously pursue all sources of oil supply to maintain an adequate flow of products to our people without the distress and shortages we experienced last winter, it will find immediate and careful attention to Mexico will prove exceedingly fruitful."

Wolverton disclosed that the committee plans to expand its petroleum investigation later this summer to take in natural gas and electric power.

Wolverton's statement touched upon a point which has bothered all of the congressional committees which have investigated the oil situation during the past year, the alleged undue concern on the part of the Office of International Trade with the provision of steel for Middle East development at the expense of the domestic and Latin American industries.

The criticisms that have been directed toward OIT policy are based on the unstable conditions which have arisen in the Middle East and the admission by military and other witnesses at hearings that the oil in our own back yard would be our major dependence in the event of an emergency, when supplies from the Middle East would probably have to be written off immediately.

Committee members claim these criticisms have been justified by the suspension of further exports of line pipe to Saudi Arabia over the second and third quarters of the year and the promise of OIT and defense officials that the situation in the Middle East will be thoroughly reviewed before any further shipments are permitted.

Meanwhile, OIT officials themselves have done little to dispel the distrust with which many in Congress view their activities. Their repeated appearances before committees have developed nothing more than a general outline of the procedure and it has never been possible to determine with any certainty just what consideration is given to the needs of the domestic industry in deciding how much oil steel is to be permitted to go abroad.

Recently, the OIT has indicated that Mexico, which previously had failed to furnish what officials considered adequate information to support applications for steel, has become more cooperative, but has not disclosed as yet whether any important quantity of tubular goods has been allocated to that country.

Venezuela a Question

Just how much steel is going to Venezuela also appears to be a question. Howard W. Page, assistant to the president of Standard Oil Co. (N. J.), testified recently that in the first quarter his company's Venezuelan subsidiary received only 25 per cent of the steel necessary for its proposed expansion program and in the second quarter only 50 per cent. Page estimated his company would require 6,000 tons a month and that the other operators in Venezuela would probably need a like amount, making an over-all total of 144,000 tons a year. But Russell B. Brown, general counsel of the Independent Petroleum Association of America, testified that actual shipments for the first quarter were just under 50,000 tons, or at the rate of close to 200,000 tons for the year.

Pratt Preparing Basis for Oil Policy Of National Security Resources Board

WASHINGTON.—An exhaustive report on oil, outlining the present situation and recommending policies aimed at insuring an adequate supply of the fuel for military and essential civilian needs in the event of an emergency, is being written by Wallace Pratt, petroleum adviser to the National Security Resources Board.

The report will embody the results of studies which Pratt has been making for the past several months, and may be the basis of suggestions to the President by the board for recommendations to Congress next year on legislation setting up a national oil policy.

Pratt's studies are understood to have covered not only the present and prospecting situation in the oil industry, but also the alternative methods of improving our oil position which have been developed over the past year in the fields of synthetic liquid fuels, federal oil reserves, tidelands, and foreign production.

More or less coincident with the submission of Pratt's report, NSRB Chairman Arthur M. Hill is expected to set up a petroleum industry advisory board committee in an effort to work in close harmony with the industry.

Hill last week announced the appointment of George E. Felton, Boston industrialist and veteran of both World Wars, as director of production, one of the key staff positions on the board. Felton will have broad responsibilities for national security planning in the whole field of production, including raw materials as well as manufactures, and utilities and communications facilities. Petroleum and natural gas are included in the materials which will come under his jurisdiction.

No Oil Legislation Is Expected From New Session of Congress

by Bertram F. Linz

WASHINGTON. — Bitter political debate will be the most plentiful, possibly the only, fruit of the special session of Congress which President Truman last week called to meet July 26 in a last preelection effort to put over his program for price controls and a handful of the reforms promised in the Democratic platform.

Denominating the move a purely political tactic, Republican members of Congress indicated that if the President wants debate on his program, including the civil rights legislation which has created a rift between northern and southern Democrats, he will get it plus discussion of other outstanding issues, possibly including the question of tidelands ownership, which framers of the Democratic platform omitted in a vain effort to get a trade for a relatively weak plank on state's rights.

The return of Congress will also permit committee members who otherwise might have devoted themselves to campaigning this summer to revive old and undertake new investigations designed to discredit the administration. More specifically, with time on their hands, the interstate commerce and small business committees may decide to push oil and steel investigations which had been slated to begin later in the year.

There is some expectation that the Republican majority will accept the President's challenge on civil rights, bring the legislation in, and sit back while the southern Democrats filibuster. They could precipitate another filibuster by bringing up repeal of the Taft-Hartley Act, on which the Democrats are badly divided. There is little likelihood, however, that Congress will pass on the President's program and adjourn in 15 days, as he told the Philadelphia Democratic convention it could.

While political angles may result in the tidelands legislation being brought up for discussion, there are no present indications that any other legislation affecting the oil industry will be considered. No action is foreseen on revision of the Natural Gas Act or the starting of a synthetic liquid-fuels industry.

President Truman has not formally announced the program he will ask Congress to pass on, but he told the Philadelphia convention he wanted action to halt rising prices, aids to education, a national health program, civil rights legislation, an increase in the minimum wage, extension of social security coverage and increased benefits, and funds for public power projects.

The call of the session threw a monkey wrench into plans of some committees for summer junkets, one of the first effects being the calling off of the trip planned by the House interstate commerce committee to Mexico next week.

But Committee Chairman Charles A. Wolverton of New Jersey plans to take advantage of the session to push the investigation of the oil situation, and has tentatively set July 27 as the date for another hearing at which it is hoped to have Army and Navy representatives present to discuss military aspects of the current and prospective supply.

Policing of Tubular-Goods Sales To Prevent Hoarding Is Proposed

WASHINGTON. — A proposal that the steel industry police orders for oil-country tubular goods to insure that they are used and not hoarded, eliminating a situation loudly protested for some time by independent operators, is being pressed by Clifford A. Hahn, head of the oil division of the Office of Industry Cooperation.

This agreement would be one of a half-dozen which Hahn is seeking, to secure for the oil industry the steel which the National Petroleum Council committee estimated would be required over the next 18 months.

The first agreement probably to be perfected will call for the provision of some 200,000 tons of steel for tankers, heaters, extractors, and other storage facilities in the producing areas, while second on the list is one for approximately 250,000 tons for tankers now under construction.

Other agreements now being negotiated will cover some storage tanks and liquid petroleum gas containers, and still others on the fire will deal with steel for terminal storage (200,000 tons or more), and barges, for which the Office of Defense Transportation asks 300,000 tons.

Hahn's suggestion that the steel mills require certificates from oil operators was originally turned down flatly by the steel industry advisory committee, who said they would not undertake to police their customers.

The matter came up in hearings before the House interstate commerce committee when representatives of the independent operators declared some of the large companies had excess stocks of tubular goods which they were willing to share with independents provided they could buy all the oil produced with the use of the steel.

Called before the committee recently, Hahn explained that he was not deterred by the initial refusal of his suggestion and had asked for further consideration by the industry committee and was told that the committee would want to see any agreement that might be reached on this point.

With the committee's interest as a weapon, Hahn now is vigorously pressing the matter and is confident the steel industry will eventually agree. Under this proposal, all orders for oil-country tubular goods would have to be accompanied by a certification that material actually would be used within a period of 60 to 90 days.

A certification procedure would eliminate hoarding and prevent bartering, it is believed. A recent survey of stocks indicated that at least 60,000 tons of tubular goods was being held in reserve against "possible" needs.

I.O.C.C. Conservation Laws Being Rewritten

The revised draft of the Interstate Oil Compact Commission's oil and gas conservation law is in the process of being rewritten and is expected to be ready for use by state legislatures convening in 1949, according to Earl Foster, executive secretary of the commission and chairman of the legal committee.

At a recent meeting of the legal subcommittee which is assigned the task of rewriting the law, in Santa Fe, N. M., framework for the new material was outlined. The meeting concerned drafting proposals relating to agreements authorizing unit operations, statutory authorization for orders providing for unitization, well spacing and the pooling for drilling of a well or wells in a drilling unit, and production control and the allocation of production.

Additions of new sections, simplification of languages in sections retained, use of tag lines for all sections, preparation of an index, and the elimination from the bill of alternate sections to be relegated to footnotes or an appendix, will be included in the project of revision.

this week

POLICY—NPC creates committee to frame oil industry's stand on national oil policy. . . . Secretary Krug warns that everybody else is doing it. . . . ¶National Security Resources Board is preparing oil policy from military standpoint. . . . ¶Ex-New Dealers draft policy outline critical of oil industry. . . . ¶Special session of Congress expected to do little affecting the oil industry. . . .

STEEL—Industry confused over abandonment of historic basing-point system of pricing steel. . . . Prices, supply sources, marketing territories may be reshuffled. . . . Change also involves cement and may affect some petroleum marketing practices. . . . ¶House committee chairman urges keeping oil-industry steel in U. S. . . . Would favor Mexico and South America over more distant lands. . . . ¶Government official has plan to stop tubular-goods hoarding. . . .

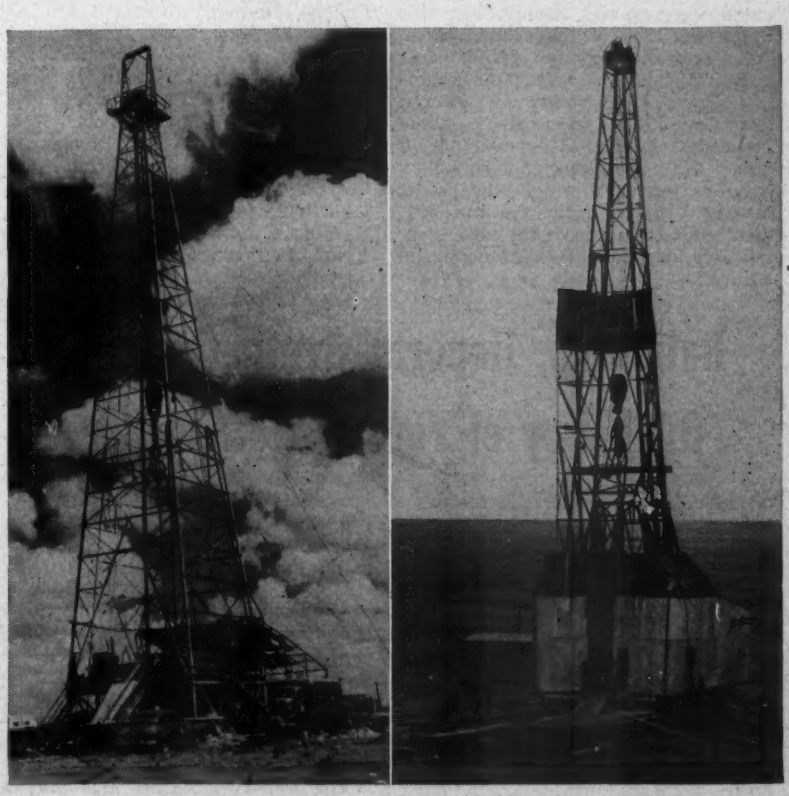
PRODUCTION—Louisiana report shows progress in gas conservation while oil activity in that state increases rapidly. . . . ¶Shell will drill up immediately Oklahoma field called world's richest gas-condensate pool. . . . ¶More companies reveal plans for offshore development in Gulf. . . . ¶Interstate Oil Compact Commission reports on crude in storage. . . . Revises its model conservation law. . . .

TRENDS—A new high for the year in well completions was achieved the week ended July 17 with total of 822. . . . ¶Crude production that week dropped to 5,439,875 bbl. daily, due chiefly to decline of 37,025 bbl. daily in Texas. . . . ¶New all-time record reached in crude runs to stills averaging 5,791,000 bbl. daily week ended July 10. . . . U. S. refineries processed more than 40 million barrels that week. . . . ¶Gasoline production hit new peak of 18,244,000 bbl. for the week. . . . ¶Stocks of four major products showed husky increase of 3,834,000 bbl. . . . Distillate fuels were 3 million of this, with one-third of it in the East Coast. . . .

INTERNATIONAL—World's tanker fleets now adequate to handle petroleum trade, new study shows. . . . No need for restrictions such as prevailed last winter. . . . Most nations' fleets exceed prewar level and much new construction under way. . . . Several oil companies building huge supertankers. . . . ¶Argument continues over export of steel for foreign oil development. . . . Middle East oil said to be essential for Marshall plan. . . . ¶Arabian wildcat indicates discovery of big new field. . . . ¶Petroleum procurement for European assistance getting into high gear. . . .

PIPE LINES—Phillips Pipe Line Corp. begins construction on 12-in. line from Goldsmith pool to Borger. . . . ¶El Paso Natural Gas Co.'s 24-in., 248-mile, Eunice, N. M.-Dumas, Tex., line has 60 miles now laid. . . . ¶Construction is under way on 11-mile line to gas wells in Matagorda Bay. . . . ¶East Tennessee Natural Gas Co. seeks authorization for additional facilities. . . . ¶First shipments scheduled to leave Morfa station on the Jal, N. M.-Cushing, Okla., line. . . .

REFINING—Phillips Petroleum Co. enters fertilizer business. . . . New subsidiary leases surplus ordnance plant to make ammonia and other chemicals. . . . ¶Pure Oil and Texaco constructing additions to their research facilities. . . . ¶Fen-Ter Refining Co. becomes division of parent Kerr-McGee Oil Industries, Inc. . . .



From border to border the search for oil is going on all over the United States. To the left is the most southerly drilling well in the country, 1½ miles north of the Mexican border in the lower Rio Grande Valley, 6½ miles southeast of Brownsville. It is The Texas Co. 1 Cameron County Water Control and Improvement District No. 5. On the right is the most northerly drilling well in the country, less than 3 miles south of the Canadian border in Glacier County, Montana. It is Union Oil Co. of California 6 Tribal 194, SE SW NW 15-37n-7w

Restudy of National Oil Policy, Asked by Krug, Approved by NPC

WASHINGTON.—Appointment of a committee to restudy and supplement the position taken by the Petroleum Industry War Council on national oil policy was announced July 19 by Walter S. Hallanan, chairman of the National Petroleum Council.

Hallanan established the committee in response to a request by Interior Secretary J. A. Krug on the recommendation of George A. Hill, Jr., chairman of the agenda committee.

In a letter to Hallanan, Krug pointed out that he had requested creation of such a committee last winter but that the agenda committee had recommended against it on the ground that the policy statement drafted by PIWC at the close of the war is still a current document which represents a comprehensive expression of the industry's views on policy.

In asking reconsideration, Krug observed that the subject of national oil policy has been a matter of intensive consideration and discussion by several branches of the Government, the public, and the petroleum industry. He declared that "the immense importance of petroleum in the world today, combined with changing facts and circumstances, has focused the national attention on this important area of the economy."

Congressional committees, government officials, and important groups of citizens have called for prompt formulation and enunciation of the broad principles of sound national oil policy, Krug said, but if such policy is to be informed and in the public interest, "it is essential that the wisdom and experience of the petroleum industry be brought to bear on the subject."

The agenda committee reconsidered its action and recommended creation of a temporary committee to restudy and supplement the former national oil policy report and to make recommendations to the Council.

Hallanan called the committee to meet in Washington July 28, the day before the full Council meeting. As chairman he appointed A. Jacobsen, president of Amerada Petroleum Corp., who was chairman of the PIWC group which drafted the previous policy statement.

Other members of the committee on national oil policy are Merle Becker, Independent Petroleum Association of America; Paul G. Blazer, Ashland Oil & Refining Co.; William R. Boyd, Jr., American Petroleum Institute; Stuart M. Crocker, Columbia Gas & Electric Corp.; Fayette B. Dow, National Petroleum Association; John B. Dressler, New Jersey Gasoline Retailers Association; R. G. Follis, Standard Oil Co. of California; Earl Foster, Interstate Oil Compact Commission; J. Parks Gwaltney, National Oil Jobbers Council; B. A. Hardey, Shreveport, La.; C. L. Harding, Socony-Vacuum Oil Co., Inc.; George A. Hill, Jr., Houston Oil Co. of Texas; Eugene Holman, Standard Oil Co. (N. J.); W. Alton Jones, Cities Service Co.; John M. Lovejoy, Seaboard Oil Co. of Delaware; A. C. Mattei, Honolulu Oil Corp.; N. C. McGowen, United Gas Corp.; Frank M. Porter, Mid-Continent Oil & Gas Association; M. H. Robineau, Frontier Refining Co.; W. G. Skelly, Skelly Oil Co.; L. S. Wescoat, Pure Oil Co.; Robert E. Wilson, Standard Oil Co. (Ind.); Ralph T. Zook, Sloan & Zook Co.; Joseph E. Pogue, Chase National Bank.

Rationing, Imports, Synthetics Form Oil Policy of Former New Dealers

THE oil industry came in for more criticism last week because of its position on synthetic liquid fuels.

In a report on the economics of oil, an organization known as Our Economy, Inc., charged it would be shortsighted to let the domestic oil industry die out without replacing it by a synthetic industry. And, it intimated, that is what the industry's present position adds up to.

"The petroleum industry is opposed to the government suggestion for a large domestic synthetic industry, subsidized in any way by the Government," the report declared. "Like other industries, it is sensitive to any suggestion of government participation.

"While industry is not adverse to the Government's bearing a large share of the research and development burden, there is no desire to see the present experimentation extended to any appreciable degree—particularly to large-scale pilot plant production of oil."

The report outlined the various avenues by which we could safeguard our oil future—increased American production outside the Western Hemisphere, further exploration and development in the United States and Latin America, development of synthetic oil, conservation and substitution of other fuels, and increased imports—and concluded that no one of them is sufficient in itself to solve the long-term problem.

But, it held, "a proper balance between wise conservation at home; judicious foreign purchasing; and the gradual development of a synthetic industry while continuing to allow for a healthy domestic natural-gas industry, could produce an adequate petroleum supply for the United States."

Policy Called Sporadic

Lack of a comprehensive national oil policy complicates the problem, it was asserted. The sporadic nature of our oil policy is reflected particularly in the history of our government's "vacillating and uncertain" attitude toward the political problems of the Middle East, as a result of which we have become involved in some awkward political problems and have not necessarily accomplished all that we had hoped would be accomplished.

"A truly adequate national oil policy rests on the eventual solution of two problems," it was stated. "First: increasing our reserves supply, domestically or through foreign sources; second: wiser use of present production.

"The first is a problem of our investment in (1) exploration and secondary recovery, (2) Latin American development, (3) foreign purchases, (4) synthetics.

"The second rests upon the willingness to take such measures as rationing when they are needed—and a willingness to plan our utilization of fuels in terms of supply."

Our Economy, Inc., is headed by a group of well-known New Dealers—Robert R. Nathan, one-time chief economist of War Production Board, being chairman; Leon Henderson, former Price Administrator, vice president; Randolph Paul, former Treasury Department tax expert, secretary-treasurer; and Lauchlin Currie, former White House economist, and Isador Lubin, former director of Bureau of Labor Statistics, members of the board.

U S. Helps Greeks Get Oil

WASHINGTON. — Civilian supply assistance provided to Greece by the United States under the $400,000,000 Greek - Turkish aid bill enacted by Congress in May 1947 included $7,557,471 worth of petroleum products up to March 31, last, it was disclosed last week by President Truman in his quarterly report to Congress on the program.

Rich Gas-Condensate Field Will Be Developed Rapidly by Shell

ELK City field in Beckham County, Oklahoma, believed to be one of the richest gas-condensate fields ever discovered, will be developed immediately by Shell Oil Co., Inc., although all wells will be kept shut in until the characteristics of the reservoirs have been ascertained and plans perfected for a natural-gasoline extraction plant.

Shell has a 28,000-acre block of land 5 miles south of Elk City, and has signed a development contract with Big Chief Drilling Co. One well will be started immediately in Section 15 and another will be started shortly a mile from the discovery well. Drilling is scheduled to be continued until the field is fully defined and developed.

The discovery well on this block was completed by Shell in December 1947 at a cost of about $750,000 and, after a 2-month testing period was shut in February 1948 so that the company might formulate an exploratory drilling program to determine the characteristics and extent of the reservoir, which is of the gas-condensate type.

According to W. A. Alexander, manager for Shell in the Tulsa area, it was felt that an enormous waste of condensate and gas would have resulted if the well had been allowed to produce while the company was assembling data on the most rational program of drilling and development for the new field.

Large Plant Required

Alexander also said that, although it is not possible to determine whether cycling of the gas might prove the best method of producing the reservoir until further wells are drilled, if the field lives up to expectations an extremely large-capacity gasoline plant would be required to obtain the greatest recovery of distillate from the gas produced.

The discovery well, J. G. Walters 1, center NE, SW of 14-10n-21w, was completed from 9,260 to 9,360 ft. in the granite wash formation of the Pennsylvanian age after drilling to a total depth of 13,133 ft. The well is capable of producing approximately 110 bbl. of condensate per million cubic feet of gas produced under proper processing procedure. Ordinary separation methods, which had to be employed during the testing period, resulted in a distillate production of approximately 76 bbl. of condensate per million cubic feet of gas, thereby wasting approximately 36 bbl. of condensate per million cubic feet, which could be recovered if efficient processing methods were employed. This, however, would entail the construction of a large gasoline plant.

Engineering data from this well also indicated that the fluid recovered exists in the form of gas in the reservoir and, in fact, there are no liquids, as such in the reservoir.

The shut-in bottom-hole pressure at 9,337 ft. was 3,996 psi. and flowing at a rate of 235 bbl. of condensate and 3.1 million cubic feet of gas daily through a ¼-in. choke was 3,695 psi. Casing-head and tubing-head pressures were 2,706 and 2,601 lb., respectively, during the flowing test.

As drilling proceeds in the block, it will be necessary for Shell to shut in each well as it is completed until the field is fully defined. However, Alexander emphasized that Shell fully intends to place the field in production as soon as sufficient data is gathered justifying the expenditure of several million dollars for a processing plant. This decision was reached after full consideration and discussion with the Oklahoma Corporation Commission and represents the best solution in the interests of conservation and of providing the best return for all interested parties.

A.A.O.D.C. Will Sponsor Two New Training Courses

THE American Association of Oilwell Drilling Contractors will sponsor two extensive training courses —care and maintenance of engines for drilling industry field personnel and supervisory administration for office personnel—it was decided last week at the association's quarterly meeting in Denver. The association agreed to continue and expand its safety supervisory program and the mud-control schools it has sponsored in 10 states.

A grant of $10,000 to the University of Texas to get the programs under way was voted at the meeting, at which E. C. Brown, Long Beach, Calif., drilling contractor and association president, presided. A like amount will be matched by the State Vocational Department and the total increased by course fees. Vocational departments in states where the schools will be held will also participate in the program.

Directors of the association at the meeting went on record as favoring installation of college courses in drilling engineering, and the education committee was instructed to consult with education officials to determine the possibility of adding this training to college curriculums.

Howard Holmes, chairman of the association's research and education committee and president of Two States Drilling Co., Dallas, reviewed the association's activities in its industry-wide program to increase efficiency in drilling operations and methods through education of personnel.

Jersey Standard Orders Eight More Big Tankers

NEW YORK.—Eight more 228,000-bbl. tankers will be built for Standard Oil Co. (N. J.), the company announced late last week. This will bring to 14 the number of such vessels Jersey Standard has contracted for within the last 6 months.

Six of the eight tanekrs will be built by the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and are expected to be completed by July 1950. The two others will be constructed by the Sun Shipbuilding & Dry Dock Co., Chester, Pa., with the date for completion in July and August 1950.

Previously, Jersey Standard contracted for construction of four of the tankers by the Newport News company and two by the Sun Shipbuilding firm, One is scheduled for delivery by the end of this year, three early in 1949, and two in the latter half of next year.

Each of the 14 tankers will have a haulage capacity about 70 per cent greater than the T-2 type tankers built during the war. Their construction will cost more than $75,000,000.

The eight additional tankers, like their sister ships, will have a service speed of about 16 knots and a deadweight of 26,000 tons. Each will be 628 ft. over-all length and have 82 ft. 6 in. of molded beam, 42 ft. 6 in. of molded depth to the upper deck, and 31 ft. 6 in. draft. The normal complement will be about 50 crewmen.

The tankers will be single-deck type with steel welded and riveted construction. Each will have a single screw driven by a high-pressure geared steam turbine capable of developing 12,500 shaft horsepower at 112 r.p.m.

The new tankers will be capable of entering most ports which can accommodate T-2s with full cargo because their draft will be only about a foot greater.

Addition of the new tankers will raise the total number in the company's fleet to 145 ocean-going ships of about 2,400,000 deadweight tons.

(For a detailed discussion of the world tanker situation, see page 52 of this issue.)

International

WORLD-WIDE OIL DEVELOPMENTS

Anglo-Iranian Has Record Year; Announces Projects for Future

WITH the most profitable year in the history of Anglo-Iranian Oil Co., Ltd., now completed, plans are well under way for even greater activity in that company's economic and social program, according to the board chairman's annual report to stockholders.

The petroleum-products output at Abadan, the world's largest refinery, averaged 371,000 bbl. daily, with a total of 18,565,507 tons in 1947. The company's smaller refineries at Kermenshah, in Iran and Alwand in Iraq, operated at slightly higher levels than in 1946. These two plants are operated largely to serve local needs.

Total crude-oil production in Iran last year was 20,194,838 tons, approximately 403,800 bbl. daily. The four main fields, Haft Kel, Agha Jari, Masjid-i-Sulaiman and Gach Saran, contributed the bulk of this production, Haft Kel alone producing nearly half of the total. Agha Jari produced over 6,000,000 tons, or 120,000 bbl. daily, "and it is clear," Sir William Fraser, chairman, said, that "we are justified in relying on this field for a larger proportion of the company's total production." Development there is proceeding steadily, both as to crude-oil production and housing for the employes.

Test Drilling Continues

In the Lali area further structural information has been obtained by drilling, and production arrangements proceed satisfactorily. The Naft-i-Shah and Naft-i-Safid (White Oil Springs) fields contributed their quota to production, but investigation of the latter area is bearing out the forecast made in 1939 that its reservoir, though important, is relatively small.

Test drilling along with geological and geophysical exploration for other oil-bearing structures in the Anglo-Iranian concession continue.

Approximately £4,000,000, or $16,000,000, was spent by the company last year in Iran for housing, health services, education, training programs, and recreational and club facilities. As the world-wide shortage of building materials eases, the company will undertake additional expansion along these lines. *(For a detailed account of Anglo-Iranian's record of housing and social achievements, see The Oil and Gas Journal, Sept. 13, 1947, page 68.)*

Fraser stated that a grave shortage of skilled manpower is now affecting the petroleum industry throughout the world. Technological advances, he explained, call for increasing standards of skill, training and experience and pressure of competition keeps the manpower factor constantly prominent.

Kuwait Jetty Planned

In Kuwait (where Anglo-Iranian has a 50-50 interest with Gulf Oil Corp.) the official 1947 production was 2,185,308 tons, approximately 43,750 bbl. daily. Fraser paid tribute to Kuwait's ruler, Sir Ahmad al Jabir al Sabah.

"Arrangements are in hand," the board chairman explained, "for the construction of a deep-sea loading jetty (in Kuwait) and it is hoped that permanent facilities for loading six tankers simultaneously, in place of the present submarine loading lines, will be completed within the next 12 months. Ancillary services, including housing schemes and amenities for the growing body of employes, are being actively expanded to keep pace with development of the field."

In Italy, Anglo-Iranian has signed an agreement with Azienda Generale Italiana Petroli for the acquisition of an interest in the refinery at Porto Marghera, Venice. Anglo-Iranian has also organized a new subsidiary, Maritime Refineries, Ltd., with the aim of erecting a new major refinery somewhere on the eastern Mediterranean seaboard.

In equal partnership with The Distillers Co., Anglo-Iranian has formed the British Petroleum Chemicals, Ltd., for the manufacture from petroleum of basic raw materials for the chemical industry. A site adjacent to Anglo-Iranian's Grangemouth refinery in Scotland has been selected for the erection of the manufacturing plant. Work is scheduled to get under way at an early date. Cost has been estimated at £5,000,000 or $20,000,000.

The British Petroleum Aviation Service, a subsidiary of Anglo-Iranian, is being expanded as quickly as shortages of equipment and facilities will permit, with the object of providing widespread aviation fueling services. "The supply of aviation gasoline throughout the East," Fraser explained, "is almost wholly derived from our production at Abadan, and our objective is put the outlet for our production of this important product, which has hitherto been mainly in the form of ex-refinery sales, on the more secure basis which results from direct participation in consumer business."

The company's projected increase in the production of lubricating oils has been retarded by difficulties and delays in obtaining equipment. However, plans are still being carried out for marketing a full range of lubricants when the new plants are completed.

Anglo-Iranian and Gulf Plan Refinery in England

Pending approval of the British Government and the availability of the necessary equipment, Anglo-Iranian Oil Co., Ltd., and Gulf Oil Corp. plan the construction of a complete petroleum refinery in Great Britain, according to an announcement of G. H. Coxon, an Anglo-Iranian official.

Probable location of this refinery is in Kent on the Isle of Grain in the Thames estuary. The projected annual capacity will be 4,000,000 tons, which is approximately 80,000 bbl. daily. Cost has been estimated at £30,000,000, which is around $120,000,000.

Anglo-Iranian and Gulf jointly own the Kuwait Oil Co., Ltd. Current daily production there is around 125,000 bbl. and the potential is much greater. Seven rigs are now in operation at Kuwait's Burgan field.

Development of Middle East Called Necessary to Fulfill Marshall Plan

THE program of aiding Western Europe and growing consumer demands in the United States make it imperative to develop additional supplies of petroleum in the Middle East, it is declared in the current issue of "Socony-Vacuum News," publication of Socony-Vacuum Oil Co., Inc.

Explaining that countries under the Marshall plan will require imports of 1,250,000 bbl. per day of petroleum and petroleum products by 1956, the article says:

"This year the United States will produce something over 5,800,000 bbl. of oil and allied products (such as liquids from natural gas) a day and will be using 5,800,000 bbl. daily. Net imports will make it possible to increase stocks of crude and products—a 'must' for this year.

"In 1956 the United States will produce about 7,200,000 bbl. and use 7,400,000 bbl.—indicating a net import need of at least 200,000 bbl. a day. Including what it needs for exports, the United States is already dependent upon the Caribbean countries for crude oil. . . .

"This year the Western Hemisphere will produce 7,525,000 bbl. a day and it will consume 6,700,000 bbl.—a margin of over 800,000 bbl. which will be required to meet the needs of the Marshall plan countries. However, over the years Western Hemisphere figures do not offer encouragement from the standpoint of sufficient margin to take care of the Marshall plan countries' import needs.

"As an example, the estimate for 1956 is that the Western Hemisphere will produce over 9,200,000 bbl. per day and consume 8,700,000 bbl. per day—an exportable margin of 500,000 bbl. In 1956, however, the Marshall plan countries will require nearly 1,250,000 bbl. a day."

To meet the growing need of the Marshall plan countries and to prevent rationing of petroleum products in the United States, it is pointed out that "there is enough oil and to spare in the Middle East to handle the job of helping the 16 Marshall plan nations back to national health."

The article declares that "only short-sightedness and lack of understanding will place obstacles in the way of the development of Middle East resources and thus prevent them from servicing the Middle East, the Marshall plan countries and the United States itself."

Aramco Welcomes New Firm To Middle East Operation

Reaffirming its stand that American Independent Oil Co. would be accorded all courtesies in its entry into the Middle East as an oil operator, Arabian American Oil Co. officially welcomed the newcomer in its regular Sunday-night newscast July 18.

This is significant for without Aramco's approval the A.I.O.C. would not be permitted to explore and develop its recently acquired oil concession in the Kuwait Neutral Zone as Aramco has the oil rights to the other undivided half.

Specifically, it was explained in the Aramco broadcast that entry of American Independent "will add to the American investment and responsibilities in that vital area and will enlarge the operations of the American system of free enterprise which is already producing large quantities of Middle East oil for Europe and for a world which moves on wheels."

(For details about Neutral Zone concession see The Oil and Gas Journal, July 15, page 54.)

New Egyptian Field Will Be Producing By Fall

By late summer Egyptian oil production will be increased by at least 600 bbl. daily from the recently discovered Asl field, located 10 miles south of Sudr on the Sinai Peninsula. This production is awaiting completion of a 6-in. pipe line from Asl to the Sudr terminal.

The Asl production comes from a depth of approximately 3,900 ft. compared with the Sudr oil horizon which is around 3,000 ft. Sudr has been producing from 7,500 to 8,000 bbl. daily for the past several months. Both of these fields are jointly owned by Anglo-Egyptian Oilfields, Ltd. (Royal Dutch-Shell) and Socony-Vacuum Oil Co., Inc.

There are eight productive wells at Sudr but not all are currently producing, while Asl has only one productive well which is capped. The fourth well at Asl has just been spudded in. *(For details on the characteristics of Egyptian crude oil, see The Oil and Gas Journal, March 11, page 60).*

International

Arabian Discovery Well Looks Like Big New Field

DISCOVERY of a large new oil field in Saudi Arabia is indicated by preliminary information on a wildcat well which has just been completed at Ain Dar by Arabian American Oil Co.

Company officials expect that this discovery may prove equally as important as the prolific Abqaiq field. Ain Dar is only 25 miles west of Abqaiq and is on an anticline about 125 miles long.

The well was drilled to 6,914 ft. and has an estimated 250 ft. of oil-bearing sand. It is the same formation as Abqaiq, Dammam and Qatif. While there has not been a quantitative production test yet, Aramco thinks that the flow will probably be similar to wells in Abqaiq field.

Discovery of this field may boost Saudi Arabia's crude-oil reserves up to around 10,000,000,000 bbl., according to one well-informed source.

Resumption of Haifa Oil Operations Sought by U.N.

To help provide additional amounts of petroleum products which are needed so badly throughout Europe and sections of the Middle and Far East, Count Folke Bernadotte, United Nations mediator for Palestine, has suggested that Haifa be demilitarized.

Haifa is the Mediterranean terminus for one leg of the Iraq Petroleum Co.'s Kirkuk-Mediterranean crude-oil pipe line. Also at Haifa Consolidated Refineries, Ltd., has a 90,000-bbl. daily refinery. Both of these operations have been forced to a standstill by the political dispute in that area.

Reflecting the seriousness of this situation is the fact that several governments are reported to have made direct appeals to Bernadotte for him to use his influence in having the Haifa area demilitarized and to permit the resumption of oil operations.

Australia Still Rations

Gasoline rationing in Australia may be continued until the end of next year if the recommendation of the subcommittee organized to study the subject is adopted. "There can be no relaxation in measures to conserve dollars, in spite of aid being given to the United Kingdom under the European recovery program," Australia's acting treasurer said at Canberra.

World Tanker Fleet Now Adequate for Current Needs and Still Growing

THE world's tanker fleets will be adequate to meet demands for at least the next 12 months, and, so far as the United States is concerned, there is no need for continuing or reinstating the emergency governmental petroleum measures which were placed in effect last winter, it is declared in a report released this week by the tanker transportation committee of the National Petroleum Council.

Tanker fleets now operating are greater than at the outbreak of the war in September 1939 by the equivalent of approximately 489 T-2 tankers, the wartime type used as a standard of measurement, and currently have a carrying capacity 63 per cent greater than prewar, the committee reported.

Between October 1947, the date of the committee's previous report, and April 1948, the world tanker fleet suffered a net reduction of approximately seven T-2's, but as of April 1 there were 302 tank vessels with a total of 4,846,670 deadweight tons under construction or on order throughout the world.

The high percentage of tanker tonnage controlled by the United States and countries being aided by the European Cooperation Administration was pointed out in the report. With the world fleet equivalent to 1,264 T-2's on April 1, the committee said, ECA countries accounted for about 540 T-2's and 42.7 per cent of total tonnage. United States ownership, both government and private, totals about 542 T-2's and 42.9 per cent of the world's tonnage.

The current status of the world's tanker fleets is given in the accompanying Table 1.

Privately owned American-flag tankers total 28.5 per cent of the world's tonnage, and tankers of Panamanian registry owned by United States citizens total 6.4 per cent. Americans now own 72 per cent of Panamanian-flag tankers.

An outstanding change since last fall, the committee reported, is the reduction in the fleet of the U. S. Maritime Commission and the commensurate increase in privately owned United States and foreign-flag tanker fleets. Maritime Commission ownership has decreased by approximately 260 T-2's, while United States military ownership increased by 45 and private United States registration increased by 110 T-2's.

Between the outbreak of the war and the present, the Maritime Commission built or acquired 796 tank ships of various types, including 536 T-2's. Of the total, 127 were returned to private owners, 103 were transferred to the military, 37 were lost, 5 were sold for scrap, 146 were sold for foreign registry, and 342 were sold to United States citizens, including 95 to United States citizens for Panamanian registry.

Today, therefore, U.S.M.C. owns only 36 tankers. Of these, 13 are laid up in the reserve fleet, 4 are operating under General Agency Agreement, and 19 are being repaired for sale. The committee remarked that for all intents and purposes the Maritime Commission program is practically terminated.

There were under construction or on order throughout the world, as of April 1, 1948, 302 tankers of various types with a total deadweight tonnage of 4,846,670. This is the equivalent of approximately 280 T-2's, and recent United States orders bring the total to 299. The committee estimated that 22 of these new ships would be put into service this year, 68 in 1949, 68 in 1950, 75 in 1951, 55 in 1952, and 11 in 1953.

With reference to the tanker situation during the coming winter, the committee believes that a total of 171 T-2's or their equivalent will be available in addition to the number operating last winter. The calculation was based on 100 T-2's taken from laid-up status, 37 Liberty-type tankers (equivalent to 19 T-2's) from laid-up status, 22 from new construction, and the equivalent of 30 T-2's due to increased efficiency under

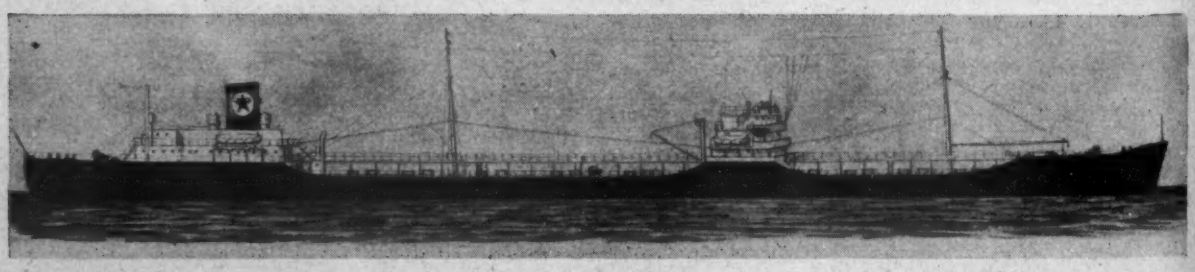
International
WORLD-WIDE OIL DEVELOPMENTS

"T-2 EQUIVALENT"

Oil tankers vary in cargo capacity, tonnage, and speed, so in order to have a standard of comparison shipping experts have adopted the practice of measuring fleets in terms of "T-2 equivalent."

This means that a fleet will carry the same amount of oil in a given period of time as a certain number of tankers of the type called by the U. S. Maritime Commission the T2-SE-A1. This vessel, which formed the bulk of the tankers built in this country during the war, measures about 16,500 deadweight tons, has a speed of approximately 14.5 knots, and a carrying capacity of about 140,000 bbl. of cargo.

How the T-2 has been outmoded since the war is shown by the specifications for this new tanker now under construction for The Texas Co.: 28,000 dwt., 240,000 bbl. cargo capacity, 623 ft. over-all length, 595 ft. between perpendiculars, 84 ft. beam, 44 ft. molded depth, 33 ft. loaded draft, 36,250 tons displacement, 16 knots service speed, 12,500 hp., double reduction-geared steam turbine, single screw. It will be among the largest tankers in the world. The Texas Co. has ordered four of these for delivery next summer. Several other American oil companies have ordered tankers of generally similar specifications



private ownership as compared with Maritime Commission operation.

Only two countries whose tanker fleets are of significant size have not yet attained their prewar levels, the committee pointed out. These are Norway, which is about 12 T-2's short of its 1939 fleet, and the Netherlands, which lacks 5 T-2's. During the past year the tanker fleets of Great Britain, Panama, Norway, Italy, and France have all increased greatly.

Significant changes have occurred since 1939 in the proportion of the total world fleets registered under various flags, says the report. Before the war the United States fleet accounted for 23.9 per cent of the total, while currently it has increased to 42.9 per cent of the world. Panama now represents 9 per cent of the total world fleet as against 4.4 per cent prewar. Increases have occurred generally throughout the Western Hemisphere, so that it now accounts for 54.7 per cent of the world fleets as against 30.3 per cent prewar. Europe, which in 1939 had 66.1 per cent of the world fleets, now has only 44.6 per cent, although its fleet actually is 12.6 per cent larger than before the war.

"The rate of increase, therefore, has been phenomenally greater in the United States and Western Hemisphere fleets than for the rest of the world," the report says. "While these increases reflect more nearly the present peacetime operations of world tank-ship fleets, it should be recalled that the peak proportionate relationship of the United States fleet was obtained on September 1, 1945, when nearly 60 per cent of the total world tonnage was registered under our flag."

International

Of considerable interest is a study made by the committee showing the employment of the American tanker fleet as of April 1, 1948. The study

TABLE 1—WORLD TANK SHIP FLEETS BY FLAG AND T2-SE-A1 EQUIVALENTS AS OF APRIL 1, 1948
(Vessels 2,000 gross tons and over)

(Source: U. S. Maritime Commission)

Flag—	Actual March 31, 1948				T2-SE-A1 Equivalent		
	No.	Gross tons	D.W.T.	Average speed (knots)	No.	D.W.T.	As % of world
Western Hemisphere:							
United States	621	5,878,786	9,395,500	14.0	541.9	9,085,000	42.9
Government	206	1,934,289	3,042,300	14.5	181.8	3,047,900	14.4
U.S.M.C.	117	984,641	1,534,800	13.2	83.2	1,394,800	6.6
Military	89	949,648	1,507,500	15.9	98.6	1,653,100	7.8
Private	415	3,944,497	6,353,200	13.8	360.1	6,037,100	28.5
Oil companies	290	2,725,540	4,402,700	14.0	246.7	4,135,900	19.5
Nonoil companies	125	1,218,957	1,950,500	13.3	113.4	1,901,200	9.0
Panama	168	1,357,645	2,158,300	12.8	113.7	1,906,200	9.0
U. S. citizen	119	942,000	1,536,700	12.9	81.5	1,366,300	6.4
Canada	18	125,189	187,100	13.1	10.0	167,600	0.8
Others:							
Argentina	26	165,980	232,800	11.5	11.0	184,400	0.9
Brazil	5	30,077	44,000	10.2	1.8	30,200	0.1
Chile	2	7,586	9,600	11.0	0.4	6,700	....
Honduras	3	14,071	21,000	11.3	1.0	16,800	0.1
Mexico	12	74,122	114,600	10.5	5.0	83,800	0.4
Peru	1	2,820	4,300	10.0	0.2	3,400	....
Uruguay	2	20,592	33,600	14.5	2.0	33,500	0.1
Venezuela	26	75,868	104,500	9.9	4.2	70,400	0.3
Subtotal others	76	391,116	564,400	11.1	25.6	429,200	2.0
Total Western Hemisphere	883	7,752,736	12,305,300	13.6	691.2	11,588,000	54.7
Europe:							
ECA countries	913	7,146,081	10,700,100	12.2	539.9	9,051,400	42.7
Belgium	5	38,967	58,500	12.2	2.9	48,600	0.2
Denmark	11	96,598	149,400	11.8	7.2	120,700	0.6
France	43	369,118	568,200	12.9	30.1	504,600	2.4
Germany	2	14,895	22,700	9.6	0.9	15,100	0.1
Greece	11	94,077	149,100	13.5	8.3	139,100	0.7
Italy	56	429,766	662,800	12.6	34.4	576,700	2.7
Netherlands	86	444,556	619,900	11.3	28.9	484,500	2.3
Norway	208	1,805,657	2,740,400	12.0	139.1	2,332,100	11.0
Portugal	6	37,469	59,100	11.9	2.9	48,600	0.2
Sweden	36	329,838	506,000	13.5	28.1	471,100	2.2
Switzerland	2	11,571	17,900	10.3	0.8	13,400	0.1
Turkey	3	19,844	30,000	13.7	1.7	28,500	0.1
United Kingdom	444	3,453,725	5,116,100	12.1	254.6	4,268,400	20.1
Others:							
U.S.S.R.	26	179,900	275,100	11.8	13.4	224,700	1.1
Spain	22	130,349	179,700	11.4	8.4	140,800	0.7
Yugoslavia	1	6,074	9,400	11.5	0.4	6,700	....
Finland	4	28,794	44,100	10.5	1.9	31,800	0.1
Poland	1	6,487	9,300	10.5	0.4	6,700	....
Subtotal others	54	351,604	517,600	11.5	24.5	410,700	1.9
Total Europe	967	7,497,685	11,217,700	12.2	564.4	9,462,100	44.6
Japan	7	60,485	85,900	13.3	4.7	78,800	0.4
China	3	29,350	44,500	10.0	1.8	30,200	0.1
Union of South Africa	2	20,896	33,600	14.5	2.0	33,500	0.2
India	1	3,391	5,400	8.0	0.2	3,400	....
Total world fleets	1,863	15,364,543	23,692,400	12.9	1,264.3	21,196,000	100.0
Total Great Britain and dependencies	465	3,603,201	5,342,200	12.1	266.8	4,472,900	21.1

obtained reports on 73 per cent of the fleet, and is shown in Table 2.

This reveals that less than half of the fleet, or 45.7 per cent, was employed in the Gulf-Atlantic Coast movement, while an additional 15.5 per cent was employed in the import movement from South America to the United States.

Out of a total of 73 per cent of the known specified services, therefore, 61.2 per cent of United States vessels were being utilized in the South American and Gulf movements to Atlantic Coast ports. This would represent about 83.5 per cent of all the vessels if it is assumed that the unspecified services were distributed in the same manner as the 73 per cent known employment. In addition, 2.5 per cent of the vessels were permanently laid up, while 13 per cent were temporarily nonoperative due to repairs. There was a weighted average of 3,889 nautical miles per vessel per trip for the voyages reported as of last April.

Analyzing known plans for the future, the committee found that 37.5 per cent of the tankers under construction or on order are to be built in the United Kingdom, 28.6 per cent in Sweden, and 18.7 per cent in the United States. These three countries, therefore, will account for nearly 85 per cent of the total construction now scheduled. It was also found that 39 per cent of this construction is for ownership by Norway, 22 per cent for the United Kingdom, and 15.6 per cent for the United States, giving these three countries ownership of an aggregate of nearly 77 per cent of the new tankers.

Serious future dislocations in tanker construction programs are indicated by the age distribution of the four major fleets of the world, the committee observed. More than 83 per cent of the United States fleet was constructed during the five war years, 1941 to 1945, inclusive. Nearly half the British fleet and two-thirds of the Panamanian fleet was also built during this period. Of Norway's fleet, 29 per cent was built during the war, 25 per cent during the 5 prewar years, 33 per cent prior to that, and 7 per cent since the end of 1945.

The report was prepared under the direction of F. R. Pratt of Socony-Vacuum Oil Co., Inc., acting chairman of the committee, and Benedict Saurino, manager of the statistical and research division of Sun Oil Co.

More Venezuelan Crude Planned for German Zones

American and British zones in Germany plan to import a total of 220,000 tons, approximately 1,540,000 bbl., of Venezuelan crude oil during the second half of this year against only 90,000 tons, or 630,000 bbl., from that country during the first half of 1948, according to the Anglo-American Control Authorities in Frankfurt.

This increase—which does not reflect the over-all total 1948 crude-oil imports for Germany—is said to be due to the progress in rehabilitating that country's refineries. It is hoped to stepup German refining capacity to 2,000,000 tons, about 40,000 bbl. daily, in the not too distant future. With such an increased capacity, it is estimated that Great Britain and the United States will be able to effect an annual saving of $25,000,000, much of which is now spent to send petroleum products into that country.

(For more details on German imports, see The Oil and Gas Journal, June 17, page 43.)

TABLE 2—EMPLOYMENT OF TOTAL UNITED STATES TANK SHIP FLEET BY AREAS (EXCLUDING MILITARY) AS OF APRIL 1, 1948
(Vessels 2,000 gross tons and over)

(Source: U. S. Maritime Commission)

Area—	Private fleet employment			U.S.M.C. fleet employment			Total U. S. fleet employment			As a per cent of total employment	Round-trip distances (nautical miles)
	No.	Gross tons	D.W.T.	No.	Gross tons	D.W.T.	No.	Gross tons	D.W.T.		
Nearby foreign:											
Canada	3	32,423	51,300	...	.....	.....	3	32,423	51,300	0.6	1,646
Mexico	2	21,251	33,600	...	.....	.....	2	21,251	33,600	0.4	1,044
West Indies, Bermuda and North Coast So. America	72	707,496	1,142,300	5	48,409	77,400	77	755,905	1,219,700	15.5	3,798
Total	77	761,170	1,227,200	5	48,409	77,400	82	809,579	1,304,600	16.5	3,642
Overseas foreign:											
Transatlantic											
Atlantic Europe and U.K.	2	17,390	27,300	...	.....	.....	2	17,390	27,300	0.4	7,448
Persian Gulf	...	.....	.....	3	31,344	50,100	3	31,344	50,100	0.6	17,028
Subtotal	2	17,390	27,300	3	31,344	50,100	5	48,744	77,400	1.0	13,649
Transpacific											
Orient and Far East	2	15,773	24,500	4	35,129	54,900	6	50,902	79,400	1.0	10,835
Total	4	33,163	51,800	7	66,473	105,000	11	99,646	156,800	2.0	12,224
Foreign to foreign	5	54,950	89,800	...	.....	.....	5	54,950	89,800	1.1	7,376
Domestic:											
Atlantic Gulf	223	2,106,382	3,407,400	12	122,122	195,500	235	2,228,504	3,602,900	45.7	3,722
Pacific Coast	29	251,495	400,300	1	10,172	16,800	30	261,667	417,100	5.3	1,802
Intercoastal	3	27,022	41,300	...	.....	.....	3	27,022	41,300	0.5	9,354
Hawaii	5	45,281	70,400	2	14,416	21,200	7	59,697	91,600	1.2	4,162
Puerto Rico	3	24,741	37,900	2	6,472	8,200	5	31,213	46,100	0.6	2,276
Alaska	1	8,489	12,700	...	.....	.....	1	8,489	12,700	0.1	3,744
Total	264	2,463,410	3,979,000	17	153,182	241,700	281	2,616,592	4,211,700	53.4	3,581
Total active specified service	...	.....	.....	...	.....	.....	...	.....	5,762,900	73.0	3,889
Unspecified service	45	456,599	737,800	10	104,169	167,300	55	560,768	905,100	11.5	.....
Laid-up vessels:											
Reserve fleet	...	.....	.....	20	129,756	198,300	20	129,756	198,300	2.5	.....
Temporarily laid up	20	175,214	276,600	58	482,652	745,100	78	657,866	1,021,700	13.0	.....
Total	20	175,214	276,600	78	612,408	943,400	98	787,622	1,220,000	15.5	.....
Grand total all vessels	415	3,944,506	6,353,200	117	984,641	1,534,800	532	4,929,147	7,888,000	100.0	.....

WASHINGTON WATCHING

BY BERTRAM F. LINZ

To Tax Unitization?

WASHINGTON, — Current concern in the oil industry regarding the tax status of unit agreements will be alleviated in the near future by new regulations to be issued by the Internal Revenue Bureau which are expected to continue the exemption granted during the war for agreements entered into purely for purposes of conservation and not for profit.

The present tax position of these agreements arose out of what is known as the West Alice field case, when a proposal to make unit operators' associations taxable was dropped when it was argued such action would interfere with the war effort by discouraging unitization.

For some time, there have been rumors in the industry that the question would be revived as a possible tax source.

The bureau now is understood to be studying the matter, and the industry is anxious for quick clarification so that it may know the status of future agreements.

It is generally expected that the present situation will continue with respect to unit plans under which participants take their production in kind or pro rata from the proceeds from pipe line sales not involving processing to any extent or distribution of dividends on profitable operations of the association, while corporation taxes may be imposed in the case of unit plans under which gas is treated and sold with a profit motive and a view of dividends in addition to the pro rata return to producer participants.

The whole thing is expected to be worked out in regulations which may be issued by the bureau within the next few weeks.

From Shortage, Safety

A MANPOWER shortage of not less than 300,000 workers will plague American industry within a year, it was predicted recently by the National Security Resources Board, and within 6 months there are possibilities that the shortage of labor will be more critical than the shortage of materials.

The NSRB report has centered attention on a campaign recently initiated by President Truman to reduce the loss of life and time involved in industrial accidents, for which an industrial safety conference has been set up which will meet late in September to map out plans to enlist management and labor in a big drive to eliminate hazards in industry.

While great progress has been made in recent years in reducing industrial accidents, with some industries showing outstanding results, conference officials say the manpower loss is still entirely too high, and the shortage of labor, present and prospective, makes safety work more vital than ever before.

The conference itself will not undertake any campaign, but will set up committees to consider the problems of specific types of hazards and then seek the cooperation of management and labor in eliminating the hazards in individual plants.

The shortage of labor will be due primarily to the drafting of young men for military service which is to begin in September and the gradual expansion of defense production, but even without these factors industrial activity is so great that the labor situation generally would be tight.

Those Basing Points

A SUPREME Court decision outlawing the basing-point price system already is being reflected in rising prices of steel, cement and other commodities used by the oil industry, and agitation is mounting for Congressional action restoring the system as it existed before the court acted.

Under the basing-point system, a customer paid the same price for these products regardless of how far he was from the mill, the delivered price usually being calculated on the basis of the price announced at the mill nearest freightwise to the buyer's destination. The court, in effect, held that a customer adjacent to a mill should rightfully pay less than one located at a distance, to the extent of the difference in actual freight costs.

Although the Government's suit to outlaw the basing-point system was designed to aid customers, present conditions are such that actually it works to the advantage of the producers, who are happily in the midst of a seller's market and can price their goods f.o.b. mill without endangering their competitive position.

The effect of the f.o.b.-mill system ordered by the court will be to increase prices in areas remote from plants, as evidenced by a 25-per cent increase in cement prices in New York, while in localities which are partly but not entirely supplied by local plants, a buyer may pay one of several prices, depending upon whether he could buy locally or had to choose between plants at various distances. Since the basing-point system was used most generally for basic commodities, the result of the court decision will be higher prices all along the line by which those commodities are translated into finished products.

Groundwork for any action taken by Congress may be the investigation to be made by a Senate interstate commerce subcommittee headed by Senator Homer Capehart of Indiana, which last session was given an appropriation of $50,000 for a study of the decision and other antitrust rulings that are causing hardship to industry and consumers. The subcommittee is expected to hold hearings shortly after the elections next November, and is to make a report before next March 15.

It's a Great Government

NATURE has little or nothing on Congress when it comes to working in mysterious ways her wonders to unfold.

For instance, no one has been able to figure out the reasoning behind the last-minute legislation which granted a flat $330 a year increase to all federal employes in the classified grades, incidentally without appropriating any money for payment of the increase.

One peculiar result of this legislation is that the help now can make more than the boss, since most appointed officials, whose salaries are fixed by Congress, receive $10,000 a year and do not get the increase, while top employes in the classified service also can make $10,000 a year and do get the raise.

Another effect of the act is to narrow the margin between the young technical employes just entering the service and the experienced head of the shop, and in signing the measure under protest, President Truman denominated the whole thing as "ridiculous."

"No successful industrial concern would tolerate a situation which provided as narrow a spread between entrance salaries and the general salary ceiling as that which now exists in the federal Government or which resulted in administrators receiving less pay than some employes supervised by them," he commented.

"Businessmen wouldn't tolerate it because they know that it would destroy the morale of the persons in their employ and, in many instances,

result in their most competent personnel seeking and obtaining employment elsewhere."

But that's Congress. Members of Congress, by the way, now receive $12,500 a year, plus mileage, stationery allowance, and an allowance for clerical assistants, who not infrequently are relatives of the member.

"Fantastic," They Say

CONSIDERABLE concern is arising in industrial circles over the military demands to be expected in the event of another war.

Men with whom military-service representatives have discussed the matter say that Defense Department estimates are "fantastic."

Naturally, what the military want and the amount they want are kept secret, but it was recently said that war requirements for one electronic component alone would require more labor than the entire radio industry now employs. And electronics in all their ramifications will play an immensely more important part in the next war than they did in the last, when they were just being developed.

The military services as yet haven't any money, but they have very ambitious plans. The procurement program now is before the Budget Bureau, which is expected to pass on it in the near future so that the expansion provided for at the last session of Congress can get under way.

One of the things that most bothers industry in connection with the expansion of our military forces is that provision of the draft act which placed the allocation of steel in the hands of the Secretary of Defense and not in the hands of a civilian. While it is expected that the application of the allocation authority will be influenced by consideration of civilian needs, it is pointed out that the civilian economy, at best, will have very weak representation in military councils.

Special Allowable for Offshore Well Continued

HCUSTON.—Kerr-McGee Oil Industries, Inc., has been granted a 6-month extension of the special 400-bbl. daily production allowable for its Block 32 Ship Shoal well, first distant offshore oil producer in the Gulf of Mexico.

The Kerr-McGee well, in which Phillips Petroleum Co. and Stanolind Oil & Gas Co. also are interested, came in last November at about 1,700 ft. Under Louisiana's depth scale, the well normally would have been given an allowable of about 70 bbl. daily, and the temporary 400-bbl. daily allowable, now extended, was granted in recognition of the high costs of Gulf of Mexico operations.

The 6-month extension of the temporary allowable postpones issuance of permanent rules for the offshore Ship Shoal area. The order, signed by S. L. Digby, Louisiana conservation commissioner, said data is insufficient thus far to set an MER but indicates the well can produce up to 600 bbl. daily without adversely affecting the reservoir.

Earlier this month, Kerr-McGee completed the second Gulf of Mexico producer with a well drilled from the same platform as a 1,000-ft. offset to the Block 32 discovery.

The company is building storage tanks of about 25,000 bbl. capacity at the Intracoastal Canal at Morgan City. Oil from the discovery well is now being barged to storage tanks in Good Hope.

Oil Deals Involved in Lend-Lease Settlement

WASHINGTON.—The State Department last week released agreements between the United States and Britain for settlement of the wartime lend-lease account, covering installations, equipment, supplies, and services in the Middle East and other areas.

Under the settlement the United States receives $7,000,000, which the department said was more than could be secured by disposing of the material in any other manner.

In a complicated disposition of each country's charges against the other, the United Kingdom accepts United States claims to $650,000 for lend-lease interest in fixed assets in Iran disposed of by Britain and $47,000 representing rentals of equipment to the Anglo-Iranian Oil Co. since September 2, 1945, and the United States accepts British claims of $793,000 for post-reciprocal aid disel oil and $65,000 for reciprocal aid interest in oil sold to Turkey in October, 1945.

The United States waived claims to $23,000 for fuel oil and subsistence provided the Royal Navy prior to September 2, 1945, and undetermined amounts for rentals of equipment to the Anglo-Iranian Oil Co. prior to that date and for lend-lease interest in oil drums sold by Britain in the Middle East. In return, the United Kingdom waives claims to an undetermined sum for oil drums furnished United States forces in Europe.

Excluded from the agreement and to be dealt with in the future are claims arising out of the operations of the Cairo-Suez pipe line and the 1942 and 1943 agreements between the United States, United Kingdom and Norway, and the original charterers of a number of tankers.

In a separate agreement on joint installations in the Middle East, the United States, upon disposal, will pay to the United Kingdom its share, proportionate to its interest in each installation, of the proceeds from such disposal. The installations affected are the integrated petroleum installations in the Sudan, which are under United States control; at El Obeid, where the respective interest of the United States and United Kingdom are $217,260 and $42,681; Khartoum City, $141,168 and $51,968, and Port Sudan, $415,540 and $72,087.

Armour Will Conduct Research for P.G.C.O.A.

Armour Research Foundation of Chicago has been authorized by the Pennsylvania Grade Crude Oil Association to spend up to $10,000 this year on a project to explore the possibility of increasing oil production by using surface-active agents to increase the wettability of water used in water flooding of underground formations.

Next Week

The JOURNAL'S own MIDYEAR REPORT special number presents

. . . A look at what the industry has done during the first half of 1948, and what it expects to do during the latter half of the year . . .

—An all-time high record for wells drilled in the first half, and an astounding program scheduled for the last half, all on a limited supply of steel, efficiently used

—A production and refining record that has already confounded the prophets of summer gasoline shortages, and a forecast of continued effort that just might do the same for the prophets of fuel-oil shortages this winter

—A pipe-line and refining construction program that dwarfs all past peacetime records, and makes steady progress despite shortages of materials

—A picture of a magnificent effort by a progressive industry to meet the public's demands for petroleum products, and a future program to surpass the record already made

Analysis of Crude in Storage Made by Compact Commission

A SURVEY showing the location and availability of the refinable crude oil and tank bottoms in storage throughout the United States has just been completed by the Interstate Oil Compact Commission.

Gov. Beauford H. Jester of Texas, chairman of the commission, explained that this is the first attempt in recent years to obtain data on the amount of oil in pipe lines, pipe-line-station working and storage tanks, tank-farm working and storage tanks, and the amount of oil in transit. The survey also includes data on oil in tank bottoms, much of it unrefinable, at refineries and other places.

A somewhat similar study of crude-oil stocks was made by the U. S. Bureau of Mines in 1936, and various members of the Compact Commission felt that because of changed conditions in the industry during and since the war a new analysis was needed to show what portion of reported stocks are needed for working purposes and are unavailable for use.

This study was started nearly 2 years ago and was originally scheduled for completion early in 1947. However, differences of opinion arose within the commission as to the nature and form of the survey, and work was suspended for several months.

Storage Details Shown

The survey was made as of January 1, 1947, and includes a breakdown of 205,432,817 bbl. of stored oil, as shown in the accompanying table. This figure represents 91.5 per cent of the total crude-oil stocks of 224,473,000 bbl. reported by the Bureau of Mines for the same date.

Of the inventories reported to the commission, 4.7 per cent were on leases, 12.7 per cent were in pipe lines, 30.2 per cent in pipe-line working tanks, 1.7 per cent in pipe-line storage tanks, 20.9 per cent at refineries, 219 per cent in transit, 12.9 per cent in tank-farm working tanks, and 14 per cent in tank-farm storage tanks.

Included in the 205,432,817-bbl. inventory were 18,269,295 bbl. of tank bottoms, which is broken down as follows: at refineries, 39.5 per cent; in tank-farm working tanks, 44.5 per cent; in tank-farm storage tanks, 4.9 per cent; and in pipe-line-station storage tanks, 11.1 per cent.

Data is tabulated to show PAW districts as well as states. Total net refinable crude-oil stocks by PAW districts reported to the commission is as follows: District 1, 12,159,301 bbl., or 5.9 per cent; District 2, 68,439,490 bbl., or 33.3 per cent; District 3, 96,147,941 bbl., or 46.8 per cent; District 4, 8,084,298 bbl., or 4 per cent; and District 5, 20,601,787 bbl., or 10 per cent.

Six leading states, according to inventories of refinable crude oil reported to the commission, were: Texas, 82,708,677 bbl.; Oklahoma, 27,520,415 bbl.; California, 20,397,481 bbl.; Illinois, 14,543,553 bbl.; Louisiana, 8,557,273 bbl.; and Kansas, 2,022,010 bbl.

Companies reporting to the commission operated 58,177 miles of trunk pipe lines, 46,175 miles of gathering lines; delivered 162,385,307 bbl. of crude by trunk line and ran 131,828,535 bbl. of crude to refineries during December 1946.

SURVEY OF REFINABLE CRUDE-OIL STOCKS IN UNITED STATES AS OF JANUARY 1, 1947

Summary of Inventories Reported to Commission	Barrels	Pct.
On leases	9,733,237	4.7
In pipe lines	26,035,483	12.7
In pipe-line-station working tanks	62,017,688	30.2
In pipe-line-station storage tanks	3,514,999	1.7
At refineries	42,896,141	20.9
In transit domestic crude oil	5,922,774	2.9
In tank-farm working tanks	26,562,169	12.9
In tank-farm storage tanks	28,750,326	14.0
Total net refinable crude-oil stocks	205,432,817	100.0
Tank Bottoms Included in Above		
At refineries	7,216,594	39.5
In tank-farm working tanks	8,132,209	44.5
In tank-farm storage tanks	900,573	4.9
In pipe-line-station storage tanks	2,019,919	11.1
Total	18,269,295	100.0

Buchanan Fills FPC Post Under Interim Appointment

WASHINGTON. — President Truman last week gave an interim appointment as a member of the Federal Power Commission to Thomas C. Buchanan of Pennsylvania, whose nomination to that post was not finally passed upon by the Senate last session.

Buchanan, who served on the Pennsylvania Public Service Commission and its successor Public Utility Commission from 1936 to 1945, took the oath of office July 14. He will serve until the Senate passes on his nomination, and thereafter if confirmed.

Military Oil Needs Up; Berlin Blockade a Factor

WASHINGTON. — The Russian blockade of Berlin, which is making it necessary for American and British occupation authorities to fly food and other necessities into the former German capital, will cost around 660,000 bbl. of 100-130 octane aviation gasoline, it was disclosed last week by the Armed Services Petroleum Board.

Military requirements for the last half of this year have been raised by that amount, bringing them to 7,875,000 bbl.

So far, it was said, industry commitments against the original requirements of 7,215,000 bbl. now total nearly 6,500,000 bbl.

In a report released last week by the National Petroleum Council, Howard W. Page, acting chairman of the military and government petroleum requirements committee, disclosed that total military requirements between July 1 and December 31 will be 61,072,000 bbl. Bulk delivery requirements will be 47,448,000 bbl., which were 82 per cent covered by offers on July 15.

By products, the military now estimate they will need over the remainder of the year 13,891,000 bbl. of aviation gasoline, 8,596,000 bbl. motor gasoline, 842,000 kerosine, 8,572,000 Navy diesel, 4,822,000 other diesel and burner, 18,486,000 Navy special fuel oil, and 5,863,000 other fuel oil.

Page reported that motor gasoline is currently the major problem, with urgent need for five cargoes in August and additional offers over the balance of the period, particularly from the Gulf-East Coast area. The aviation gasoline situation is somewhat better, although there is urgent need for one additional cargo next month. The motor gasoline bulk requirements are only 57 per cent covered, but aviation gasoline offers are 89.5 per cent of needs.

Offers of Navy diesel represent 86.1 per cent of needs, other diesel and burner 64.3 per cent and Navy special fuel oil 89.5 per cent. No offers have been received on kerosine.

Export Control Procedure Tightened to End Abuses

WASHINGTON.—Export control procedure is being tightened up by the Office of International Trade to eliminate abuses uncovered by congressional investigations last session.

New regulations will make unlawful the alteration of export licenses, trafficking in licenses, misrepresentations in applying for export permits, and other practices made possible by the loose procedure originally set up.

ERP Countries Buying Oil Abroad With Dollars Donated by U. S.

WASHINGTON.—Inquiries to Washington regarding the workings of the European recovery program indicated that the manner in which the oil and other purchases of the Marshall plan countries are financed is not generally understood.

Actually, the United States is financing the purchase of all oil bought with dollars, and will never be reimbursed. Probably not more than one-fourth of the funds expended under the Economic Cooperation Act ever will be repaid.

ERP funds are distributed in two ways—loans and grants. Loans are made for internal development in the borrowing countries — water works and other public projects—and are to be repaid eventually.

Grants are funds allocated to the several countries for the purchase of the petroleum and other products they may require. Requirements programs are prepared quarterly by each country and are reviewed by the Organization for European Economic Recovery in Paris, of which the Economic Cooperation Administration is not a member but has representatives present in an advisory capacity.

Requests Reviewed Twice

The scaled-down programs approved by the OEER come to Washington, where they are again reviewed, this time by the ECA, and allocations then are made, advising each country how much money it will be permitted to spend and what it will be spent for during the quarter. As purchases are arranged, the ECA issues commitments which, in effect, assure the supplier that he will be paid. Originally, ECA specified how much oil was to be acquired with an amount committed, but dropped that practice when it was pointed out it might in effect be fixing prices. Now ECA merely specifies the amount to be spent, as, for instance, last week's authorization to France of $155,000 for petroleum products, but maintains a watch to see that purchases are not made at higher than the market price. With the exception of lubricating oil, aviation gasoline, and a few other specialties, oil products for Europe are procured in Latin America or the Middle East, and the ECA commitments specify the area from which supplies are to be drawn.

The confusion regarding the financing of these purchases arises from a requirement that any foreign country securing oil or other commodities under ERP must set aside in a special fund the equivalent of the dollar value in local currency such as pounds, francs, or guilders. These funds, however, are not, with two exceptions, destined for use by the United States, but are to be applied to economic recovery within the country on programs developed by the country itself and the ECA mission there.

The two exceptions are, first, the ECA costs within the country, which are met in local currencies, may be defrayed from these funds and, second, that not less than 5 per cent of the fund of a specific country must be allocated for purchase by the United States of strategic materials, where avilable.

The resentment voiced in some of the countries, particularly England, over the "strings" to ECA aid is based on these and other requirements of the act, such as those calling upon the European countries to put their financial houses in order and balance their budgets.

In effect, however, every dollar granted a Marshall Plan country does double duty. It purchases commodities needed by that country for relief or rehabilitation, and it insures that an equivalent sum is spent within the country for recovery purposes. But only the amounts advanced as loans will ever find their way back to the United States, and that only if and when the European recovery program gets Europe back on its economic feet.

Levy Will Head Oil Work Of European Aid Program

WASHINGTON.—Petroleum operations of the Economic Cooperation Administration will be administered by Walter J. Levy of New York, appointed last week to head the ECA petroleum, oil, and lubricant office.

Levy, who since last March has been an economic adviser to Socony-Vacuum Oil Co., was chief of the petroleum section of the Office of Strategic Services during the war and a member of the committee on enemy oil, an intelligence group under the Joint Chiefs of Staff, for which work he received a Presidential Certificate of Merit. He also was a member of the United States world programming group for petroleum in 1944 and 1945, with responsibility for foreign civiliam petroleum requirements.

He was a member of the American delegation for postwar trade discussions with Sweden in 1945, a State Department delegate to discuss international oil problems with Great Britiain in 1946, and a member of the U. S. delegation of the Austrian Treaty Commission in 1947.

As a State Department expert in charge of petroleum research, he was consultant on oil for the Harriman committee and petroleum adviser to Secretary George C. Marshall at the Council of Foreign Ministers meeting in London last December, and reviewed and revised the oil requirements set up by the Committee for European Economic Cooperation in planning the European Recovery Program.

ERP Oil Authorizations Now Total $106,714,914

WASHINGTON. — Procurement authorizations for $103,000 worth of petroleum products for France and $749,957 worth for Greece were announced last week by the Economic Cooperation Commission, bringing such commitments under the European recovery program to $106,714,914 as of July 17.

The products for Greece will be procured by the Navy Department, the ECA stated.

Requirements programs of the Marshall-plan countries for the current quarter have been cut $500,000,000 by ECA but allocations for specific commodities have not yet been finalized, it was disclosed by Administrator Paul G. Hoffman July 19.

Hoffman explained that the estimates as revised by ECA have been sent back to the OEEC in Paris and probably will be returned to the individual countries for review.

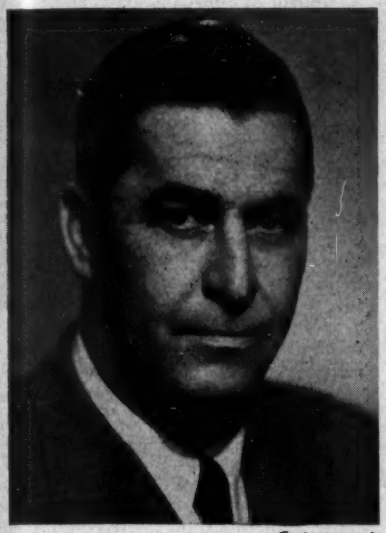
Basic allotments of $1,017,800,000 have been made for the third quarter with supplementary allotments of $101,000,000. The former will cover the procurement of commodities, including petroleum and products, from the Western Hemisphere and Saudi Arabia as well as the United States, and the latter is for purchases between participating countries.

Sun and The Texas Co. Establish Fellowships

A $5,400, 3-year fellowship fund for the segregation and study of crude-oil acids in natural petroleum has been established by Sun Oil Co. at the University of Texas. The university Board of Regents announced acceptance of the award last week.

The Texas Co. has established a fellowship at the University of Oklahoma in chemical engineering. Appointment will be made for the period beginning September 1, and is for one calendar year with option of renewal. The stipend amounts to $1,500 per calendar year.

PERSONALS



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Anderson to Head Caltex Operations East of Suez

WARD P. ANDERSON has been promoted to general manager of all California Texas Oil Co., Ltd.'s, operations east of Suez and in the eastern Mediterranean territories, the New York headquarters of that company announced. This step climaxes a 12-year period during which Anderson has had a wide experience in the part of the world to which he returns in his new capacity.

Receiving a bachelor of science degree from the University of California in 1925, Anderson started his training for a refinery executive by joining the research and development department that year, at Richmond, Calif. Later he was transferred to the cracking department as foreman. Practically all his work in the research and development department was in connection with pilot plant operations.

When a man was needed to head refining operations at the Caltex plant in Bahrein in 1936 Anderson was sent over as superintendent for the plant then under construction. He was made general manager of refinery operations there in 1942, and in 1946 was transferred to Caltex's New York City offices. His headquarters will remain in New York. In the east of Suez area the plant facilities at Bahrein are being expanded to make a more complete and rounded-out operation, without increasing the plant's crude capacity appreciably. Caltex is building a refinery in Holland, and is also rebuilding the plant at Bordeaux, France.

Richard T. Colquette, formerly chief engineer for Root Petroleum Co., El Dorado, Ark., has been elected vice president. **R. L. Aycock,** formerly traffic manager for Root, has been elected a director of the company.

John L. Hart, who has been with Phillips Petroleum Co. in the tax, insurance, and claims department at Midland, Tex., has been named to succeed **M. G. Langhorne** as division manager at Midland. Langhorne was recently named manager of a newly created division office for crude-oil purchases and sales at Dallas, Tex., for Phillips.

R. W. Grunert, secretary for South Penn Oil Co., has been named controller to succeed the late C. E. Crawford. Grunert will hold both positions.

T. H. Sherman, secretary-treasurer for Huntington State Co., Los Angeles, has been elected chairman of the Conservation Committee of California Oil Producers.

J. H. Snyder, formerly with several internationally known manufacturers and merchandisers in the automotive and aviation fields, has been appointed director of market research for Continental Oil Co., Ponca City, Okla.

K. E. BEALL

K. E. Beall, manager of the economics department for the past 2 years for Phillips Petroleum Co., Bartlesville, Okla., has been elected vice president, economics department, to succeed **J. M. Sands,** who is retiring. Beall, a graduate engineer from Purdue University, joined Phillips in 1920 in the production department, and was transferred to the economics department upon its organization. Sands joined the company in 1919 as consulting geologist and head of the geological department, which position he held until 1924 when the company's economics department was formed and he was chosen to direct the activities of that department.

H. O. Ruark, former superintendent at Wichita Falls, Tex., for Shell Oil Co., Inc., has been named division production superintendent at Oklahoma City. **A. T. Eyler,** of the Tulsa office, has been named division exploration engineer at Oklahoma City to succeed **Al Rylands,** who recently became production manager for a new division at Corpus Christi, Tex. **R. L. Ferris,** subsurface engineer of Eldorado, Kans., succeeds **J. M. Garlick,** who has been transferred to Tulsa.

John M. Pierce, economist for Western Oil & Gas Association for the past 3 years, has been appointed executive secretary of the association. He succeeds **Don E. Gilman,** who recently resigned as executive vice president.

Max H. Reynolds, with Atlantic Refining Co. for 14 years, has been placed in charge of the company's newly opened sales office of its chemical products division in Chicago.

J. J. MULLANE

Dr. J. J. Mullane, former assistant to the president of Carter Oil Co., Tulsa, has been transferred to the Standard Oil Co. (N. J.) in the New York office. He is now a foreign production executive with Jersey Standard. Before being assistant to the president of Carter, Mullane was chief production engineer. He took the place of **Ray P. Walters** in Jersey Standard. Walters recently became manager of exploration activities for Standard Oil Co. of Egypt, S.A., and is now in Cairo.

Frank Cooter has been named in charge of the Fort Worth division office of Cities Service Oil Co. The company recently opened division offices there to direct operations in the Permian basin and in the North Texas district.

Norval Ballard, geologist for Kerr-McGee Oil Industries, Inc., at Oklahoma City, has resigned to join Northern Ordnance, Inc., at Oklahoma City where he was open offices for that firm.

Arthur F. Graf, Jr., has been elected president of Granite Oil Securities, Inc. He is also vice president and chief engineer of Granite Oil Trust Co., No. 2.

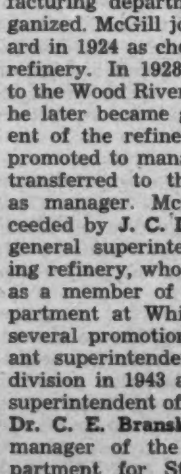
Otto E. Zawnzig and **Thomas J. Shanley** have been appointed acting director, bureau of statistics, American Gas Association, and secretary, A.G.A. accounting section, respectively. They succeed **Walter E. Caine,** who is resigning both positions to become secretary and treasurer of Texas Eastern Transmission Corp.,

PERSONALS

Shreveport, La. **Daniel Parson,** A.G.A. statistician, has been promoted to senior statistician.

Fred B. Branson and **Allen H. Lemmon** have been elected assistant comptrollers of Gulf Oil Corp. Branson will supervise production, pipe-line, and research accounting and auditing, and Lemmon general administrative accounting.

Dr. Gustav Egloff, director of research, Universal Oil Products Co., has been reelected president of the Chicago Technical Societies Council.



M. H. Major, formerly district geologist for Republic Natural Gas Co. in Corpus Christi, has joined the geological department of Tennessee Gas Transmission Co. in Houston as senior geologist. Major is a University of Texas graduate, holding B.S. and master's degrees in geology.

Leroy Donald has joined the staff of Lion Oil Co. as chief agronomist to direct the agricultural activities for the company.

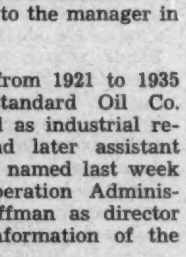
Dr. W. J. McGill, manager of the Whiting, Ind., refinery of Standard Oil Co. (Ind.), has been promoted to the new position of superintendent, manufacturing operations in the Chicago general office where the manufacturing department has been reorganized. McGill joined Indiana Standard in 1924 as chemist at the Whiting refinery. In 1928 he was transferred to the Wood River, Ill., refinery where he later became general superintendent of the refinery and in 1942 was promoted to manager. In 1946 he was transferred to the Whiting refinery as manager. McGill has been succeeded by **J. C. Ducommun,** assistant general superintendent of the Whiting refinery, who joined the company as a member of the engineering department at Whiting in 1929. After several promotions he became assistant superintendent of the light oils division in 1943 and assistant general superintendent of the refinery in 1944. **Dr. C. E. Bransky,** assistant general manager of the manufacturing department for Standard, will retire September 1 after more than 38 years' service with the company. He first joined Standard in 1910 as a research chemist at Whiting. In 1934 he was transferred as manager of the Whiting refinery to the general office at Chicago as assistant general manager of the manufacturing department.

Donald A. Morgan, consulting geologist, has moved his offices to Cody, Wyo., from Mt. Vernon, Ill. Formerly with the foreign division of the Petroleum Administration for War, Morgan has been specializing in both Rocky Mountain and Illinois basin areas, since leaving Washington at the end of the war.

James J. Donnelly, in the research and development department at Paulsboro, N. J., for Socony-Vacuum Oil Co., Inc., and **Frank A. Angona,** with the field research laboratories of Magnolia Petroleum Co., in Dallas, a Socony-Vacuum affiliate, have been named recipients of the two graduate fellowships granted this year by Socony-Vacuum.

E. LeRoy Young, who has been with Carter Oil Co., Tulsa, for the past 14 years, has been elected secretary of the company.

J. L. Ainsworth, a Rice Institute graduate previously with Fomac Engineers, Houston, has been appointed plant chemist of Plant 1 of McCarthy Chemical Co. at Winnie, Tex.



Denver R. Williams, assistant to the manager of the crude-oil purchase and sales department of Ohio Oil Co., Findlay, Ohio, has been appointed manager of that department. He joined the company in 1926 and in 1932 he was transferred to the crude-oil purchase and sales department after having served in the transportation department and later in the production division. He was made assistant to the manager in 1945.

Bryan Houston, from 1921 to 1935 associated with Standard Oil Co. (Ohio) at Cleveland as industrial relations director and later assistant sales manager, was named last week by Economic Cooperation Administrator Paul G. Hoffman as director of the office of information of the ECA.

Eight new graduates, three in petroleum engineering and five in geology, have joined Ohio Oil Co. and have been assigned to various offices in Texas. The petroleum engineers are **Drayton E. Morris,** now at Iraan, and **David T. Kiester,** now at Midland, both University of Texas, and **James J. Ross,** Texas A. & M. graduate, now at Hobbs. Those in the geological department, all University of Texas graduates, are: **Robert W. Grayson,** and **James W. Tartt,** both assigned to the division office in Houston; **Calvin S. Smith,** at San Antonio; **Thomas F. Head,** at San Angelo; and **Joseph E. Keyser,** at Wichita Falls.

R. S. HOMET

R. S. Homet has been appointed general manager of the foreign trade department of Socony - Vacuum Oil Co., Inc. Other changes in the department include: **J. J. Petley,** who becomes a member of the foreign trade committee, taking over the position previously held by Homet, with responsibility for the company's operations in Portugal, Spain, West Africa, Spanish Morocco, Canary Islands, Gibraltar and Tangiers; **Phillip Clover,** who has been recalled from Europe to become a member of the foreign trade committee, with responsibility for South and Central America, Germany and Austria; and **J. S. Vesey Brown,** who has been appointed manager of the West Africa division. **F. E. Powell, Jr.,** continues as chairman of the foreign trade committee of the company.

Tom Duncan, LaSalle, Ill., has joined N. V. Duncan, Inc., contractor-producer at Fairfield, Ill.

M. M. Montgomery, formerly executive assistant to **J. E. Rouse,** vice president in charge of operations for Stanolind Oil & Gas Co., Tulsa, has been promoted to assistant operating superintendent in charge of producing operations for the company. A petroleum engineering graduate of the University of Oklahoma in 1933, Montgomery joined Standard in 1936 as a petroleum engineer at Lake Charles, La. He will be succeeded by **Lewis Finch, Jr.,** formerly West Texas district superintendent at Midland, Tex. Finch joined Stanolind in 1937 after graduation from Oklahoma A. & M. where he received his civil engineering degree. Both Montgomery and Finch will be headquartered in the company's Tulsa general office.

Frank Smith has become Tennessee Gas Transmission Co.'s new safety engineer. He was transferred to T.G.T.'s main office in Houston from Victoria, Tex., where he was district pipe-line foreman for the company.

Anthony Banks, assistant to management of the treasury department, banking division, The Texas Co., in New York, has been appointed assistant treasurer of the company. He will

have offices in Houston and will replace **J. C. McKenna** who is returning to the company's New York office to assume charge of domestic banking matters.

J. W. Schmotzer, district geologist for Arkansas Fuel Oil Co. at Jackson, Miss., has been named division geologist at Shreveport, La.

M. W. Sherwin, district geologist at Jackson, Miss., for Sohio Petroleum Co., has been named division geologist at Houston.

C. N. Valerious, division geologist for Barnsdall Oil Co. in Shreveport, La., has been elected president of the Shreveport Geological Society for the 1948-49 year.

R. L. Clifton, chief geologist of Champlin Refining Co., Enid, Okla., has resigned to become a consultant with offices at Enid.

G. B. Gierhart, formerly senior geologist with Humble Oil & Refining Co. at Corpus Christi, Tex., has opened offices as a consultant in the Wilson Building in Corpus Christi. Gierhart was with Humble 22 years, working in South Texas and northern Mexico.

Paul Ginsel, formerly of Alice, Tex., has been named company representative in charge of the new Corpus Christi office being opened by the crude-oil purchasing and sales division of Magnolia Petroleum Co.

Dr. Theodore A. Link, chief geologist for Imperial Oil, Ltd., has resigned after an association of 29 years with the company, to engage in general consulting practice. He will establish offices in Toronto, Ont., and Calgary, Alta. Link was in charge of the party which located the discovery well in the Northwest Territories, and was geologist in charge in western Canada exploration during much of the development of Turner Valley.

SHIFTS—

R. E. McClintock, superintendent, Rocky Mountain Drilling Co., Coalinga to Oxnard, Calif.; **A. S. Houdek,** foreman, Shell Pipe Line Corp., Baytown to Houston, Tex.; **Julius T. Espey, Jr.,** engineer, Stanolind Oil & Gas Co., Corpus Christi to San Antonio, Tex.; **Kenneth R. Joynt,** engineer, Magnolia Petroleum Co., Kermit to Sundown, Tex.; **R. P. Broutherton,** foreman, The Texas Co., Midland to Sundown, Tex.; **Thomas B. Lambert,** engineer, Shell Oil Co., Inc., Odessa to Midland, Tex.

William F. Huddleston, engineer, Texas Petroleum Co., San Antonio to Big Lake, Tex.; **Charles T. Johnson,** engineer, Stanolind Oil & Gas Co., San Antonio, Tex., to Oklahoma City; **C. F. McCarroll,** engineer, Sunray Oil Corp., San Antonio, Tex., to Tulsa; **Jack P. Anderson,** superintendent, Solvay Process Co., Baton Rouge, La., to Syracuse, N. Y.; **Robert V. McAfee,** engineer, Sun Oil Co., Delhi, La., to McAllen, Tex.; **J. J. Patton,** superintendent, Fisher-McCall Oil & Gas, Inc., Grand Rapids to Grandville, Mich.

Donald W. McCafferty, superintendent, National Gas Oil Corp., Crooksville, Ohio, to Reno, Nev.; **Walter C. Jenneman,** superintendent, The Texas Co., Eldorado, Kans., to Tulsa; **R. C. Anderson,** superintendent, San Joaquin Drilling Co., Price, Utah, to Newhall, Calif.; **A. E. Benson,** foreman, Amerada Petroleum Corp., Douglas, Wyo., to Lewiston, Mont.; **George A. Ashland, Jr.,** geologist, Carter Oil Co., Rawlins to Rock Springs, Wyo.; **Eugene F. Lewis,** engineer, Phillips Petroleum Co., Dewey to Kaw, Okla.

C. F. Martin, engineer, Shell Oil Co., Inc., Healdton, Okla., to Odessa, Tex.; **Herbert G. Rim,** geologist, Geophysical Service, Inc., Oildale to Santa Barbara, Calif.; **J. J. Wright,** engineer, Stanolind Pipe Line Co., Weatherford to Fort Worth, Tex.; **J. J. Pitts,** foreman, Robert H. Ray Co., Bay City to Jasper, Tex.; **F. C. Dick Turner,** superintendent, Crow Production Co., Garland City to Lewisville, Ark.; **Horace L. Temple,** engineer, Continental Oil Co., Owensboro, Ky., to Electra, Tex.

I. G. Wise, superintendent, Texas Eastern Transmission Corp., Oran, Mo., to Shreveport, La.; **George Stanford,** superintendent, Rocky Mountain Drilling Co., Ventura to Bakersfield, Calif.; **Maxey Brooke,** chemist, Alamo Refining Co., Brazoria to Old Ocean, Tex.; **C. W. Gore,** superintendent, Markham Drilling Co., Albany to Cisco, Tex.; **George H. Calhoun,** engineer, Shell Oil Co., Inc., Houston to Kilgore, Tex.; **O. E. Van Meter, Jr.,** engineer, Magnolia Petroleum Co., Houston to Midland, Tex.; **R. W. Blackburn,** engineer, Continental Oil Co., Rio Grande City, Tex., to Ville Platte, La.

John B. Ross, engineer, The Texas Co., Houma to New Orleans, La.; **Jack F. Harang,** geologist, Gulf Oil Corp., New Orleans to Baton Rouge, La.; **E. P. Wells, Jr.,** engineer, Standard Oil Co. (Ind.), Whiting to East Chicago, Ind.; **E. F. Abplanalp,** superintendent, Barnett Drilling, Inc., Russell to Great Bend, Kans.; **J. T. Gist,** geologist, Pacific Western Oil Corp., Casper, Wyo., to Midland, Tex.; **Frank Barrett,** foreman, Ohio Oil Co., Lovell to Rawlins, Wyo.; **Rex G. Bloomfield,** foreman, Ohio Oil Co., Powell to Cody, Wyo.; **H. L. Lawler,** engineer, Stanolind Oil & Gas Co., Tulsa to Vivian, La.

DEATHS

Clinton H. Longshore, 60, president of Longshore Petroleum Corp., New York, died July 12 in Westfield, N. J. Before establishing his own company in 1932 he had been with Standard Oil Co. of New Jersey (now Esso Standard Oil Co.); vice president of Ridgefield Oil Corp., New York; vice president of Acewood Petroleum Corp.; and vice president in charge of sales for Sinclair Refining Co.

George West Holland, 63, who as principal attorney for the U. S. Geological Survey inaugurated the unit plan procedure for federal oil and gas leases first authorized by Congress in 1931, died July 16 in Washington. During the war he was special assistant to the deputy administrator of the Petroleum Administration for War.

W. C. Morgan, 53, district manager of the northwest territory for Buda Engine Sales & Service, Inc., died July 14 in Evanston, Wyo. Morgan started his oil-industry career in 1913 with Central Fuel Oil Co., later Wolverine Oil Co., Bartlesville, Okla.

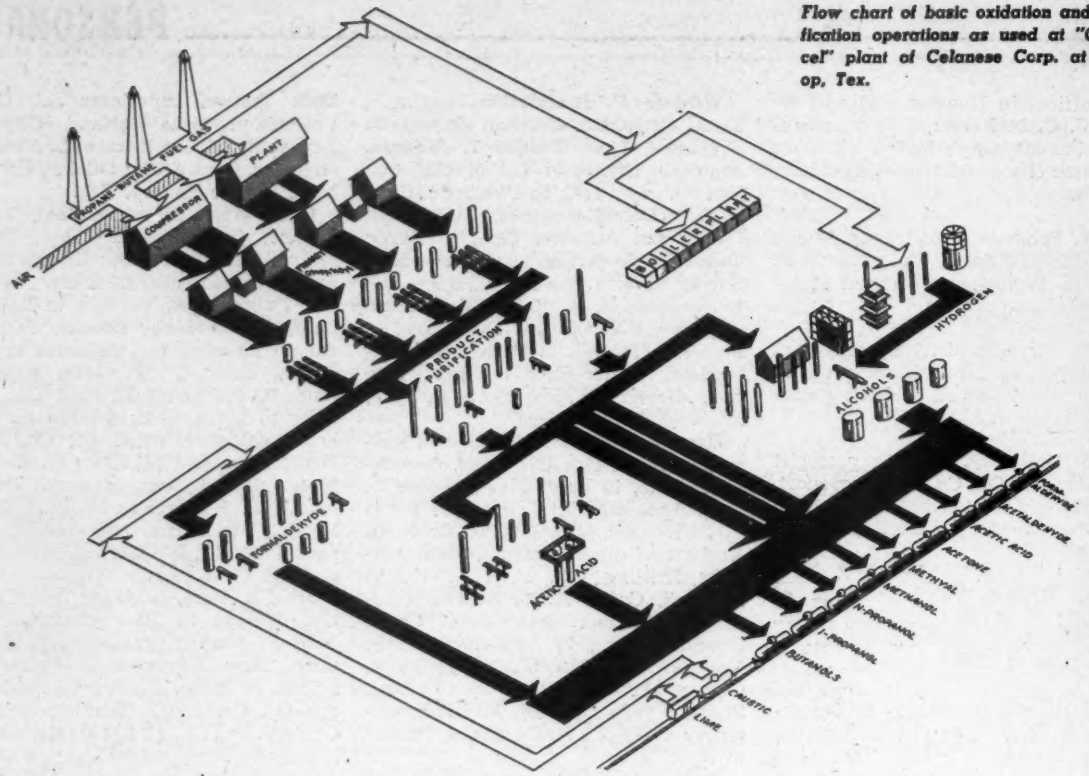
W. G. Sanders, 67, associated with L. K. Pump Valve Co. for 15 years and active in the oil-field supply business in Houston the last 30 years, died July 11 in Houston.

Dr. Edward Payson Mathewson, 83, president in 1923 of the American Institute of Mining and Metallurgical Engineers, died July 13 in Tucson, Ariz.

Lawrence B. Quick, 58, chemist in the Bayway refinery in Linden, N. J., for Esso Standard Oil Co., died July 12 in Elizabeth, N. J.

Robert P. Batson, 83, retired secretary-treasurer of Chalmette Petroleum Corp., died July 8 in New Orleans.

Louis P. Percy, 33, driller for Phillips Petroleum Co., died July 12 in Phillips, Tex.



Flow chart of basic oxidation and purification operations as used at "Chemcel" plant of Celanese Corp. at Bishop, Tex.

A Journal Plant Report:

CELANESE CORP.'S New Bishop, Tex., PETRO-CHEMICAL OPERATION

by Arch L. Foster
Refining Editor

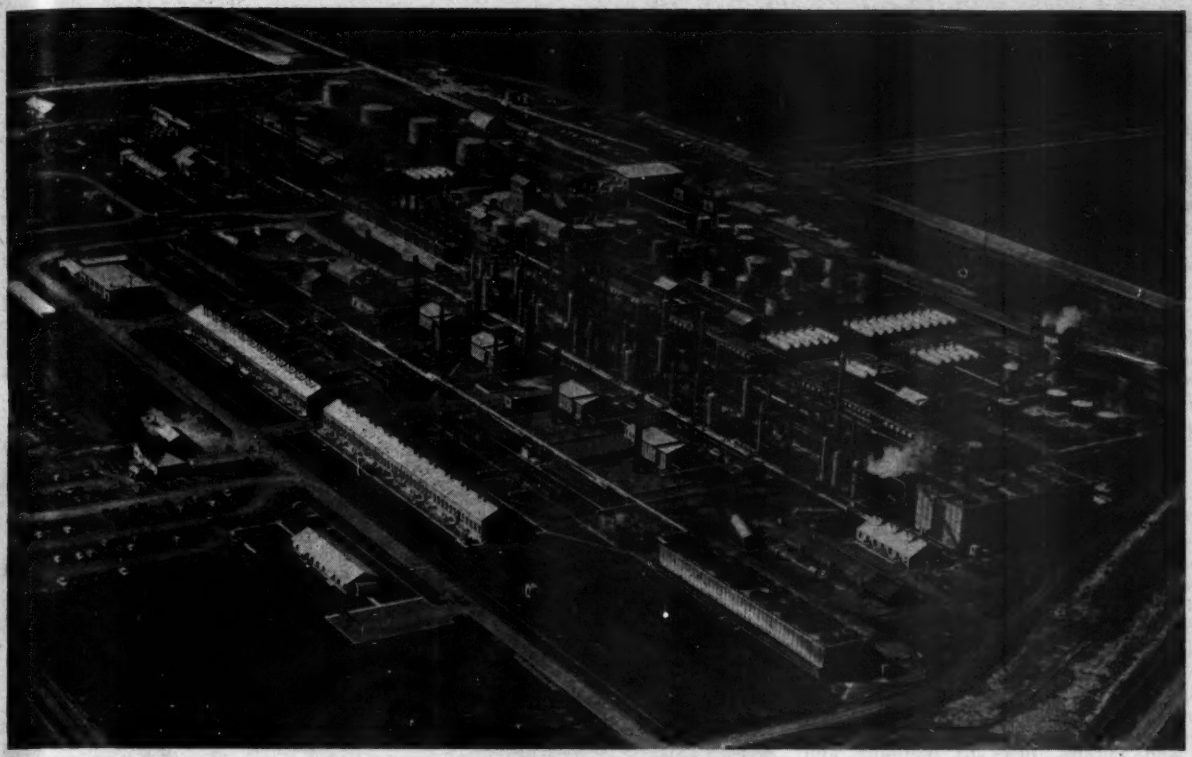
PRODUCTION of aliphatic chemicals derived from petroleum and natural gas has grown in less than a decade from negligible proportions to a major chemical industry. With a dozen or more different plants located on the Gulf Coast and others planned or in course of construction, progress in this field is outstanding. Among the pioneers in this industry is Celanese Corp. of America, with its large and expanding plant at Bishop, Tex., in the center of a vast natural-gas producing area.

Synthesis of basic organic chemicals by the direct oxidation of aliphatic hydrocarbons had been known as a "laboratory curiosity" for many years. However, it is only recently that this operation has become a commercially large industry, growing rapidly especially along the Texas and Louisiana Gulf Coasts where the raw material—natural gas—is available in abundance. Celanese pioneered a large number of these processes through the test-tube and pilot-plant stages, finally building a full-scale commercial plant at Chemcel, near Bishop, in South Texas. The first units were completed there late in 1945.

The entry of the Celanese interests into the study and development of organic hydrocarbon-derived chemicals is the outgrowth of their venture, starting in 1924, into manufacture of cellulose acetate, widely used in plastics, yarns, and other products. Faced with the necessity of supplying itself with some of the more important intermediates for this process, in the early 1930's the Celanese research organization began the development of processes for making oxygenated hydrocarbon chemicals on a large scale. Up to that time the amounts of organic chemicals made direct from petroleum and natural gas were negligible except for Cities Service's installation in northern Oklahoma.

By 1941 Celanese chemical engineers had pushed the process development to the point of building and putting into operation a semiworks-scale pilot plant at Cumberland, Md. This cost $1,500,000, and by the end of 1942 enough design data had been obtained to warrant the construction of a large-scale plant for the oxidation of hydrocarbons to produce numerous derivatives. World War II sidetracked these plans for a time but by the end of 1945 the new plant was completed and beginning operations on the large quantities of natural gas in southern Texas.

The following year the parent company organized a separate division, the Chemical Division of Celanese Corp. of America. By the end of that year, large-scale production of propionaldehyde, n-propyl alcohol, and other chemicals was achieved. At present an entire list of these chemicals is available, most of them in tank-car quantities, and going to users all over the country. Later a separate research and development organization was organized, entirely



Aerial photo of the Celanese-Chemcel plant, showing the newest additions to the plant "family"—new cooling tower, storage tanks, fractionator columns. A large maintenance shop now under construction will be completed in August

independent of the operation of the manufacturing plant.

The process as operated now consists of the careful oxidation under rigidly controlled conditions of temperature, pressure, charge rate, oxidant-gas stock ratios, and catalyst. The reaction product contains a highly complex mixture of products, some with widely varying boiling points, and some boiling so close together that chemical engineers despaired of separating them by any known means. Operating details are not disclosed, but to isolate these various materials a partial list of the steps used includes simple distillation-fractionation, azeotropic distillation, adsorption, absorption, solvent (selective) extraction, evaporation, and other highly specialized operations. In several cases isolated materials are subjected to further chemical treatment, including oxidation, to yield products not formed in appreciable amounts in the initial or primary oxidation step.

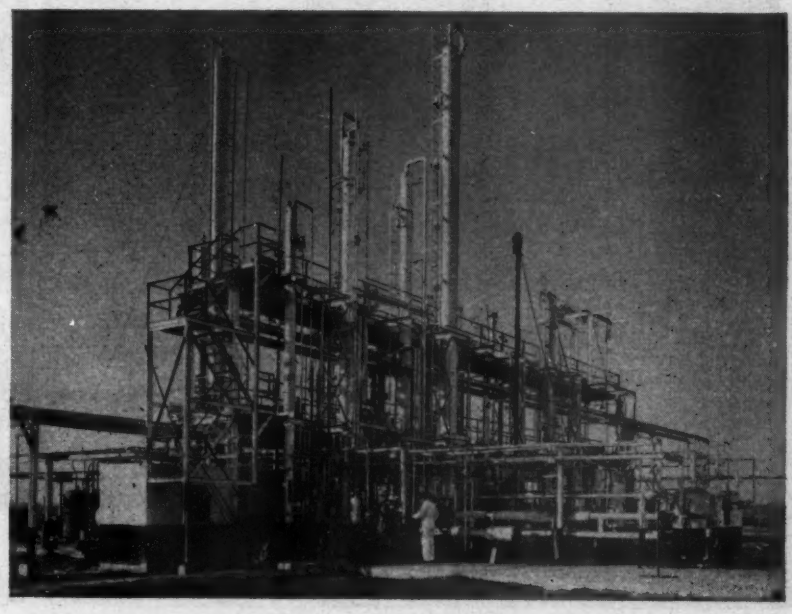
Alloys for Corrosion Prevention

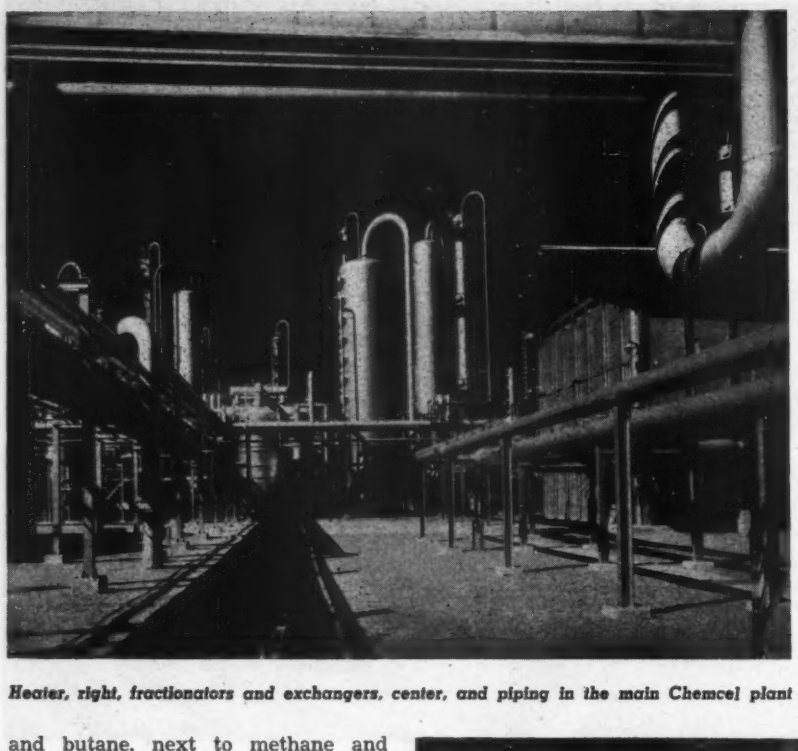
One of the major problems in development of the process and its equipment was that of corrosion prevention. Many of the aldehydes, acids, and so on are highly corrosive at elevated temperatures. Mild steels and other metals, the installation of which was made imperative because of the scarcity of the more noble alloys, lasted in service only a few weeks or months in many cases. Stainless steels, chrome-nickel, and chrome-nickel-moly alloys, and monel are used widely in the various units and are indispensable in combating the serious attacks by the products during processing.

Another problem was that of adequate and efficient heat exchange. Many different gases are processed, and the conditions to be met in exchanging heat between them, and between gases or vapors and liquids, presented a number of unusual situations. In numerous instances entirely new designs of exchangers were made to meet special conditions.

The primary oxidation reactions at the plant are carried out on propane

Celanese research-unit pilot plant at Clarkwood; additional pilot units are being added regularly





Heater, right, fractionators and exchangers, center, and piping in the main Chemcel plant

$$C_3H_8 + 1/2\ O_2 = \underset{\text{n-propyl alcohol}}{CH_3{-}CH_2{-}CH_2{-}OH} + O_2$$

$$= \underset{\text{propionaldehyde}}{CH_3{-}CH_2{-}CHO} + \underset{\text{water}}{H_2O} + 1/2\ O_2$$

$$= \underset{\text{propionic acid}}{CH_3{-}CH_2{-}COOH}$$

By eliminating one carbon atom from propyl radical, $CH_3{-}CH_2{-}CH_2{-}$, to form the ethyl radical $CH_3{-}CH_2{-}$, similar oxidation reactions produce ethyl alcohol, acetaldehyde, and acetic acid. In another procedure acetic acid can be dehydrated to form acetic anhydride, a highly important intermediate in many chemical syntheses:

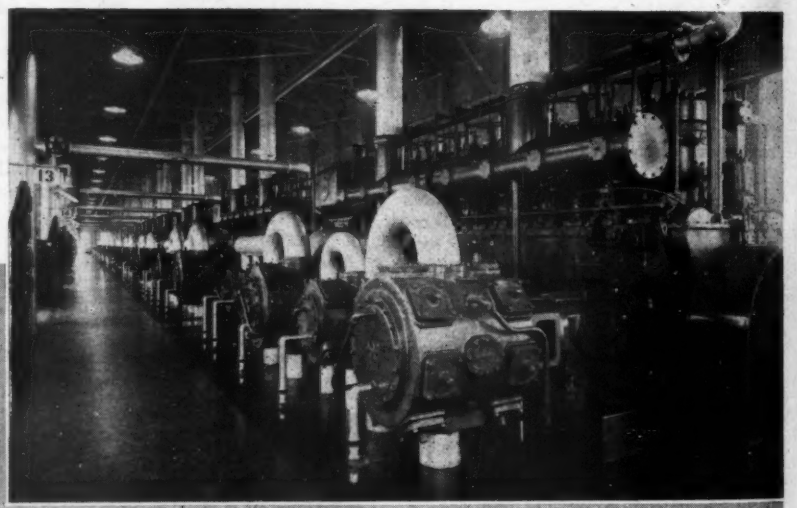
$$\underset{\text{(2 mols)}}{2\ CH_3{-}COOH} = \underset{\text{acetic anhydride}}{(CH_3{-}CO)_2O} + \underset{\text{water}}{H_2O}$$

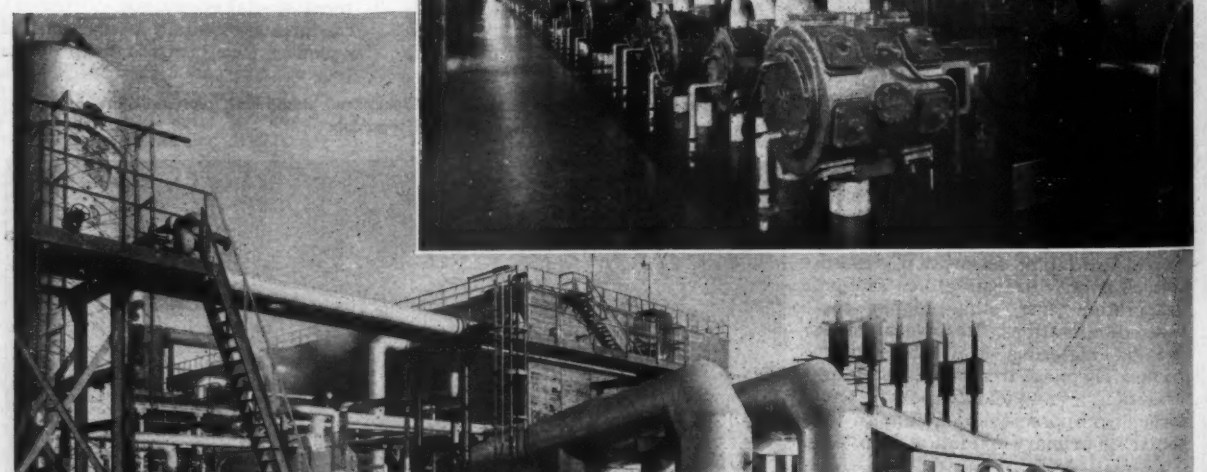
Propane can be oxidized to form dimethyl ketone (acetone),

$$CH_3{-}\overset{\overset{O}{\|}}{C}{-}CH_3,$$

(Continued on page 75)

and butane, next to methane and ethane the most common constituents of natural gas. Their oxidation produces a large number of different, but closely allied, chemicals: n-propyl alcohol, propionaldehyde, propionic acid, and the corresponding butyl derivatives. The primary reactions are, for propane:





Inset: This long line of compressors handles a good part of the gas processed. A similar compressor line is in another building. Bottom: A hundred thousand gallons per minute of Nueces River water is circulated through the plant, although only 3,500 g.p.m. is required to make up all water lost or consumed in processing. The water enters the cooling towers through huge lines in foreground

ECONOMICS OF AERIAL MAGNETICS

by Charles J. Deegan

THERE are some erroneous ideas prevalent about airborne magnetometer surveys, particularly about the size of the area that must be involved to make such a survey economically practical. This is only natural, because most of the publicity has dealt with big jobs, where large-scale operations were a necessity. To judge all possible applications of aerial magnetic surveys by these big jobs is just as mistaken as it would be to assume that all truck hauling must be done by 10-ton transports.

Under the right set of conditions, it is economically possible to transport goods in medium-size, or in small trucks. Under other conditions, a motorcycle and sidecar is sufficient. The airborne magnetometer will hardly ever get down to the equivalent of the motorcycle sidecar class of jobs, but given very favorable conditions, an aerial magnetic survey of an area as small as 20 miles wide by 20 to 25 miles long is economically feasible.

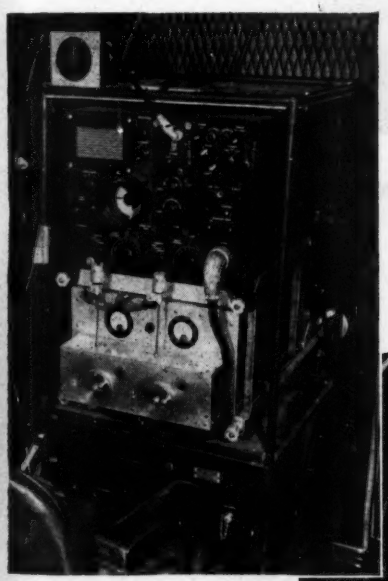
There are two sets of factors that govern the economics of any aerial magnetic survey. One set centers around the fact that the instrument is carried in an airplane. The other set results from certain properties of the instrument itself, and the relationship of these properties to the character of the magnetic forces which the instrument measures and compares.

Some of the problems involving the airplane are obvious. A plane is a fairly expensive vehicle, both in first cost and in operation. It requires an airport as a base, and a servicing and maintenance organization. It has the great advantage that it can cover ground rapidly. But production time is only that portion during which the plane is in the air over the area to be surveyed, with the magnetometer functioning. Every time the plane has to move to a new operating base, nonproductive time is involved in the move and transferring the servicing and maintenance personnel.

Productive Time vs. Total Time

There are two general ways to keep productive time at a high percentage of total time. One, well publicized, is to cover a large area from a single base. The other, not so well understood, is to plan a series of small areas to be covered on a schedule which will permit short moves between jobs. Since weather is always a factor in flying, the season of the year is apt to have an especially important bearing on the cost of small jobs. Overhead goes on just the same while the plane is hangar bound by bad weather. If the volume and geographic distribution of small jobs can be fitted into a seasonal time schedule, designed to avoid bad flying weather, unproductive time from this source will be reduced, and costs can be better controlled.

But the major factor arising from the use of a plane is the cost of sur-



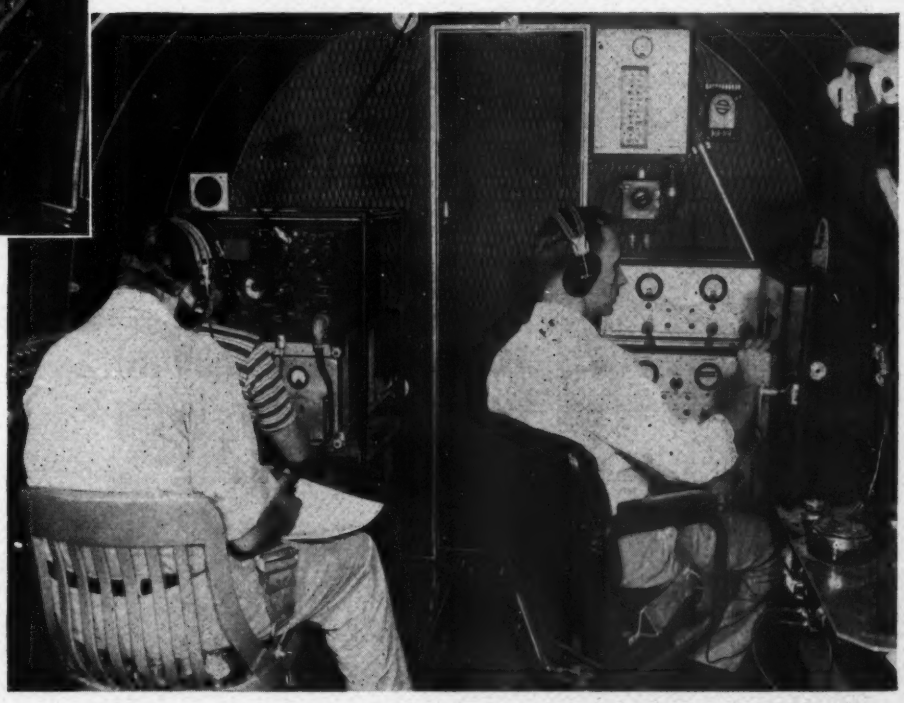


Fig. 1—(Right) Interior of DC-3 plane using magnetometer. At left the shoran flight path director partially obscures shoran operator; on right is magnetometer operator and instruments. Inset above is plane shoran instrument panel. Flight director is in communication with pilot. Operator calls shoran dial readings to director, who checks these against precalculated readings on plan of proposed flight lines. If deviating from planned flight path, director calls course corrections to pilot

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the formula for progressive refining?

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veying. To be of any value, the magnetic measurements made in the plane must be accurately plotted on a map of the ground surface. Therefore some method must be used which will permit the magnetic data to be transferred to the point on the ground surface that was directly beneath the plane when the observation was made. This is a surveying problem.

The kind of surveying required is probably the primary factor in determining the minimum-size area that can be covered economically with an airborne magnetometer. Most of the aerial magnetic work that has been publicized has been in areas where shoran radar methods were required. (See Figs. 1 and 2.)

Shoran is the most expensive and elaborate surveying method in use in aerial magnetics, insofar as initial cost and daily operating expense are concerned. Out of a total crew of 27 on the Gulf Oil Corp. survey of an area in Florida, 14, or more than half, are required to operate the shoran equipment and reduce the data to map plots. The minimum number of men needed for a shoran survey, regardless of the size of the area, is 10.

Square Mile Cost Low

While this is a lot of manpower and equipment, the cost per square mile surveyed is very low, when a large area is covered. But reduction in the size of the area to be surveyed makes only a small difference in the total investment and daily operating expense. Hence, if only a small area is to be surveyed, the cost per square mile will be high.

Fortunately for the future prospects of aerial magnetics, there are many places in the United States where it is not necessary to use shoran. Moreover, it is in these very places that most of the small-sized tracts are apt to be located. The size of acreage blocks tends to shrink as production develops in any given region. But the economic factors that result in smaller blocks also have caused considerable mapping to be done, roads to be built, and numerous man-made changes will be evident on the land surface, such as buildings, wells, pipe lines, tanks, etc. dotting the landscape. Generally the accurate geographic positions of these items are available.

The basic requirement for a reasonable-cost aerial magnetic survey of a small area is the prior existence of either accurate ground maps, or aerial photographs, on which easily recognizable terrain features can be spotted from the magnetometer plane by the navigator. (See Fig. 3.) In sectionized country where the road network outlines section and township corners, the navigator merely has to punch a button at section and township road intersections. This will make a mark with a number on the magnetic record, identifying the ground

Fig. 2—Aerial photograph of type of terrain suitable for aerial magnetic survey without use of costly radio surveying methods

point. If working from an aerial photographic mosaic, the navigator picks out easily recognizable terrain features, either natural, such as hills, stream intersections, etc., or man made, such as buildings, tanks, etc., and punches the button while he marks his mosaic. A corresponding mark and number will appear on the magnetic record.

If the terrain has no easily identifiable features, as might well be the case in comparatively flat desert country, or in swampy terrain along a low coast line, or of course in offshore areas, then simple, low-cost surveying is impossible and the costly shoran method must be used. Under such terrain conditions, only large areas are economically feasible for aerial magnetics.

The second set of factors that determine the economic limits of aerial magnetic surveys results from the nature of the magnetometer and the magnetic forces of the earth. Like most instruments involving electronic equipment, the magnetometer will vary in accuracy of results recorded over a period of time. This variation is called "drift," and fortunately it increases or decreases at a fairly steady rate under any given set of general conditions.

Therefore by returning to an established system of control base lines at regular intervals, the total accumulated amount of "drift" during that interval can be determined. Then the proportionate amount of drift at each observed point can be added or subtracted, according to the direction of drift. Sometimes the drift causes the recorded values to read too high, sometimes too low.

Diurnal Variation

If instrument drift were the only adjustment involved, the problem would be much simpler. There is, however, another factor called the diurnal variation. Roughly this can be defined as relatively short-period variations in the intensity of the earth's magnetic field at any one place that are caused by forces from outer space, probably from fluctuations in radiation from the sun.

All airborne-magnetic readings must be adjusted to eliminate the variations resulting from both instrument drift and diurnal variation. With the present type of magnetometer used in aerial work, these two factors cannot and need not be segregated. Because of the electronic circuits used, instrument drift is inevitable, and no two instruments will have the same rate of drift. The diurnal variation can be, and often is, measured on the ground, but usually by an entirely different type of instrument, and the measurements cannot be applied (economically at least) to

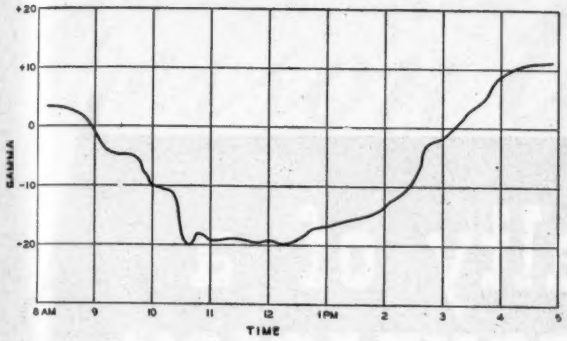


Fig. 3—(Left) Magnetic diurnal variation which might be found anywhere in the United States on any working day when magnetic storms were absent, but magnetic conditions unusually rough

Fig. 4—(Below) Enlargement of 10:00-11:00 a.m. period on Fig. 3, during most abrupt changes

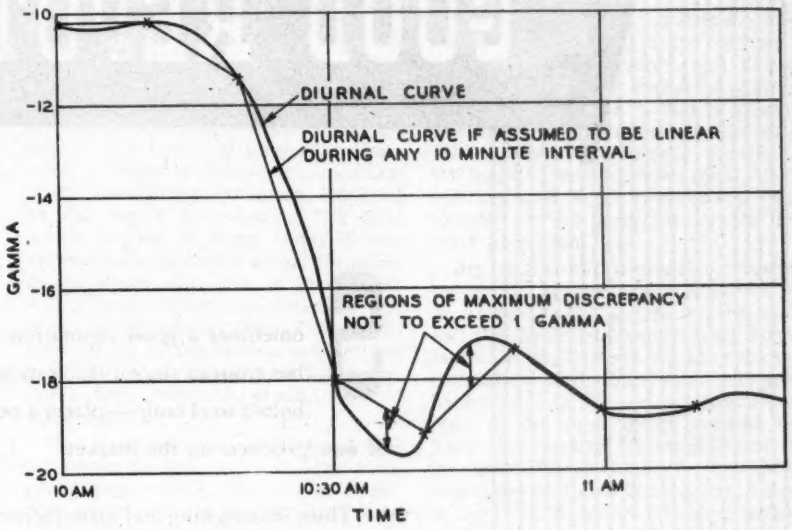
the variation from this source that is included in the aerial magnetometer's readings.

In general, the drift-free type of instrument used to measure diurnal variations, measures only the vertical component of the earth's magnetic field. The aerial magnetometer, on the other hand, measures the earth's total field and gives a value which includes the total effect of the horizontal and vertical components.

Consequently to make a workable magnetic record, some method must be devised to measure the sum total of instrument drift plus diurnal variation at each point where an observation record is plotted. This is achieved by setting up a network of control points, at which accurate relative values are determined. An arbitrary starting point is selected and a reading made. All subsequent readings are related to the original one at the starting point.

From the arbitrary starting point a series of traverses are flown. If the starting point is "A," then a closed traverse establishes the true relative value at point "B," by adjusting the instrument reading at "B" by half the difference between the two readings at "A" (the start and the finish). Then from "B" as a reference point, a closed traverse is flown to "C," "D," or as many points as are desired, with the procedure being repeated. Eventually all the individually closed traverses are given a final check, by flying a closed traverse from the last one of the series to "A," the initial point of the whole series. Then the sum of all of the adjustments in the individual traverses must add up to zero. Therefore all subsequent readings at any of these reference points, when adjusted, will bear a true relative value to the starting point "A."

By this means, a network of control points is established with correct relative magnetic values. These points are so spaced that in all subsequent flying, a control point is reached at about every 10 to 15 minutes, if at all possible. This time interval is determined by what is known about the properties of diurnal variation. The measurements of the vertical component of the diurnal, over a long period of time in many parts of the United States, indicate



that the variation is linear (i.e. at about the same constant rate) for about 10 to 15 minutes. (See Figs. 4 and 5.)

Flight Line Limits

This property of diurnal variations is important, because in aerial magnetics, all adjustments in establishing control points, and all subsequent adjustment of flight recordings, are made on a linear basis. That is, it must be assumed that the observed difference in two readings at the same point has accumulated at an even rate.

Since it is known that diurnal variation can be depended on to be linear for not more than 10 to 15 minutes, this establishes the practical limit as to the distances between control points. To hold the accuracy of the final readings to the limit of 1 gamma, the control points must be established not more than 10 to 15 minutes flying time apart. All subsequent flight lines must be so planned that a control point in the network is crossed within these same time limits.

When the procedure of tying magnetic survey lines to a control grid is used, both the instrument drift and the diurnal variation can be taken care of adequately.

Considering both sets of economic factors affecting aerial magnetics, those revolving around the fact that a plane is used, and those resulting from the diurnal variation plus instrument drift, it is apparent that the common denominator is time. Time limits the freedom of operating techniques in the air; yet time in the air is the only productive period for plane and instrument.

The airborne magnetometer is a mass-production instrument. Only as a mass-production instrument is it economically feasible. But mass production is dependent on the amount of flying time out of the total time involved from moving from one job to another, starting up, finishing, and arriving at the starting point of a third. If not used on a small series of big jobs, it must be used on a large number of small jobs, scheduled to take advantage of short moves and good seasonal flying weather.

In general it is probably safe to assume that the slower the plane, the smaller the size of the area over which it is economically feasible to make an aerial magnetic survey. The time-factor limit of 10 to 15 minutes which necessitates crossing check control points periodically, and the time consumed in the initial operation of setting up the network of these control points, result in a flying pattern of a series of straight lines and turns. Flying turns is dead time economically. Too fast a plane over a small area would probably be uneconomic.

On the other hand, if shoran surveying is necessary, nothing smaller than the equivalent of a DC-3 type of plane is large enough, all things considered. This is true even though the weight-carrying capacity of the DC-3 is greater than the required load. The DC-3 happens to have a speed and range, as well as load capacity, that is suitable for large-area aerial magnetic surveys.

(Continued on page 77)

The Penalty of a GOOD REPUTATION

Sometimes a good reputation—like Maloney-Crawford has enjoyed since 1912 as manufacturer of the original bolted steel tank — places a penalty on the establishing of new products on the market.

Thus, in designing and manufacturing of new and improved products in our various lines, we had to pay the cost of several extra years of field testing and several years of loss sales just because our reputation demanded that we be more than absolutely sure there wasn't the slightest chance of damaging our good name in offering new lines.

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Wesson Unit

. . A MODEL

GAS-CONSERVATION PROJECT

by George Weber

AN outstanding example of increased oil recovery through unit operation is indicated for the Hogg sand reservoir, Wesson field, Ouachita County, South Arkansas. The result of a combination of enlightened cooperation among operators and royalty owners, and sound engineering practice in a state noted for its active encouragement of conservation, Wesson unit will clearly demonstrate the payoff on progressive production methods. A field-wide water-flood program to be initiated this summer will provide a 165 per cent increase in estimated ultimate oil recovery over natural depletion methods, to augment net returns to unit participants an estimated three-fold.

While it does not comprise a large oil reserve, the Hogg sand is of interest because of its unusual characteristics which make it especially suited to unit operation. The field was discovered in late 1945 and by the end of the following year a total of 14 Cretaceous zones had been proven for production over a small faulted area of less than 700 acres. The Hogg sand, a lenticular sand-bar deposition in the Pine Island formation, emerged as the major reservoir of the field when, a year or more later, it was successively extended about 3½ miles to the south and west. A total of 63 active wells were completed in the sand by mid-June 1948. The southwest limits of production are not yet defined, but it is felt that the reservoir's area will not greatly exceed 1,200 acres.

The reservoir has no apparent water drive, no gas cap, and very little solution-gas drive. The original solution gas-oil ratio was calculated from bottom-hole-sample analysis to be 65 cu. ft. per bbl. As a result, pressure declined rapidly, and wells went to artificial lift shortly after production began. From an estimated original pressure of 1,280 psi., the reservoir had declined by April 1948 to 448 psi. with cumulative withdrawals of approximately 1,250,000 bbl. of reservoir fluids. (See Fig. 1.)

On the other hand, the closed elongated formation is an excellent project for flooding. The clean uniform sand shows an average permeability of 2,772 md. This high permeability which caused immediate field-wide pressure decline during past production, will allow rapid uniform pressure buildup on injection of gas or water in volumes exceeding production.

Unitization Plans

Operators early recognized the need for cooperative effort to prevent a serious loss in recovery, and discussion of unit plans began as soon as field extensions indicated a reserve of more than minor importance. While field development continued, the usual operating, geological, engineering and legal committees were formed to lay groundwork for the final unit plan.

An operators' committee, headed by R. G. Lawton, vice president of McAlester Fuel Co., directed the work for the three subcommittees. H. R. Bean of McAlester; W. H. Spooner, consultant, and other geologists prepared and agreed on an isopachous map of the sand which formed the basis for equity determinations in the unit. Completion of this work was delayed by continued extensions to the field. In March, the map shown in Fig. 2 was accepted by all parties as representative of the reservoir as developed at that time. When the Hogg sand is eventually defined, the map will be completed and equities recomputed on the new basis.

Well surveys, performance data, and other field information necessary for evaluation and operating plans were compiled by the engineering committee, headed by H. R. Bean and Vernon Turner, both with McAlester Fuel Co. In cooperation with

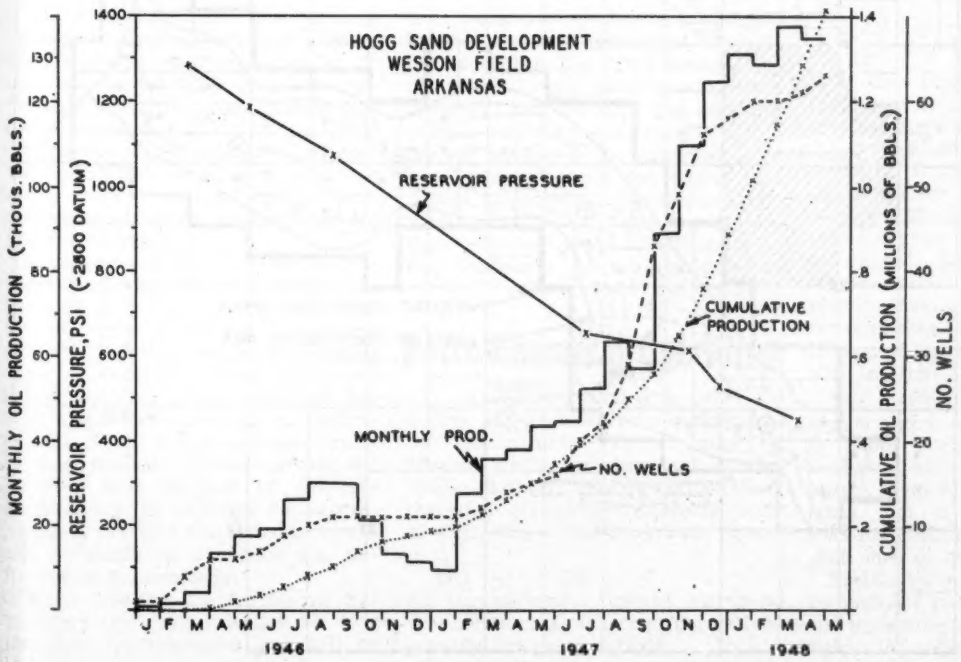


Fig. 1 — Throughout a fairly erratic 2½-year period of development and production, the Hogg sand reservoir at Wesson has shown a continuous pressure drop, from an estimated original of 1,280 psi. to around 400 psi. as unitization becomes official. Water injection exceeding gross withdrawals from the sand will continue under unit operation until the reservoir has been pressured up to 1,500 psi.

Fig. 3—The central water plant for repressuring the reservoir will be located in this southwest section of low topography, allowing gravity drainage of all produced water to the plant. With a high uniform permeability, little pressure gradient exists through the reservoir. All wells in the field as then developed, were placed on the pump during the same month, February 1947. Repressuring will allow wells to flow once more, eliminating the added cost of artificial lift

all other groups, the legal committee meanwhile drafted a unitization and pressure-maintenance agreement and a royalty pooling agreement. The operators' agreement was signed by representatives of 10 companies owning 60 of the 63 active Hogg sand wells in the field, and before June, more than 250 persons owning over 70 per cent of all royalty interests in the pool had entered into the royalty pooling agreement.

As provided under the laws of the state, operators then made application before the Arkansas Oil and Gas Commission for a public hearing on the plan. All data on the program were presented June 15, and shortly after, the commission, having approved the application for unitization, issued orders on the field. According to the terms of the agreements, unitization became effective July 1, 1948. McAlester Fuel Co., which holds about 50 per cent interest in the unit, was named operator.

The unit area, including all productive 20-acre tracts, comprises 1,720 acres, of which 1,207.63 acres are underlain by productive Hogg sand. Participation in the unit is based directly on the volume percentage of effective Hogg sand owned by each operator. Both agreements incorporate the accepted provisions of modern unit and pressure-maintenance agreements. Also provisions made in unitization instrument for voluntarily including any (or all) future developed Hogg sand tracts.

Operation Methods

The production method to be inaugurated at Wesson was determined after a complete study of the reservoir, directed by the engineering committee. By common agreement, the operating committee retained the services of a disinterested consulting firm, James A. Lewis Engineering of Dallas, to study the field and recom-

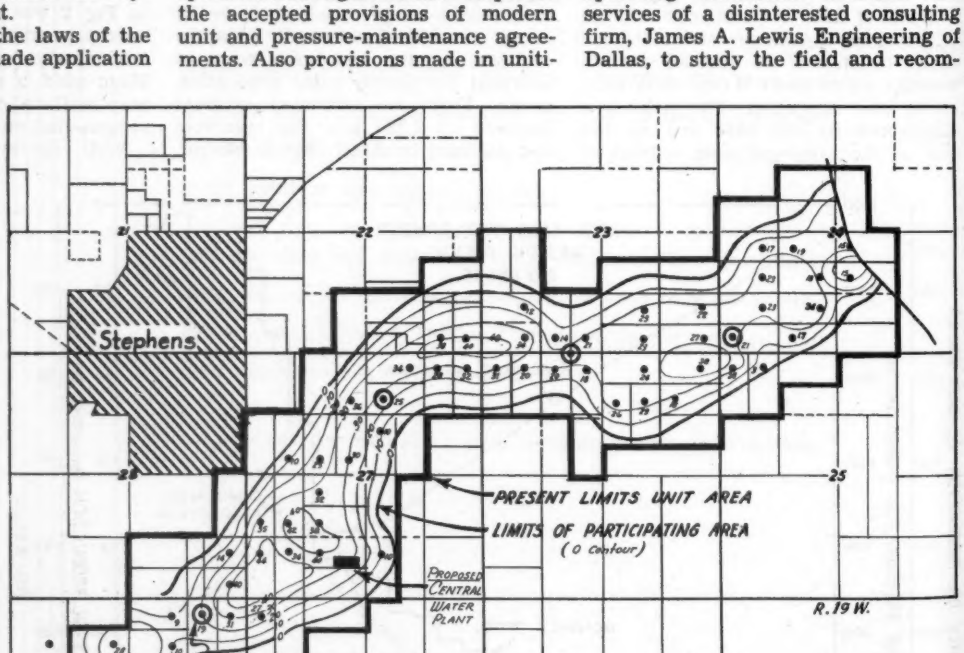

Stephens
PRESENT LIMITS UNIT AREA
LIMITS OF PARTICIPATING AREA
(0 Contour)
PROPOSED CENTRAL WATER PLANT
Proposed injection locations including 3 existing wells and 1 new location
R. 19 W.
T. 15 S.

Fig. 2—The isopachous map of the Hogg sand, accepted by all operators' geologists, forms the basis for determining equity in the unit. The unit area includes all 20-acre tracts underlain by effective Hogg sand. Newly completed wells on the southwest end will probably be incorporated in the unit as provided in the agreement. Water injection will take place along the axis of the field

mend the best procedure for unit operation.

The Lewis study, based on all field information made available by operators, resulted in the evaluations listed in Table 1. Total oil originally in place is estimated at approximately 47,000,000 bbl. Under the common pressure depletion method of production, recovery was estimated at 19 per cent or 8,975,000 bbl., although the economic limit might reduce that figure even further. The prospects for additional recovery of oil at economic rates from gravity drainage alone, were considered remote since the entire structure shows comparatively little relief.

TABLE 1
Hogg Sand Reservoir Characteristics and Recovery Estimates, Wesson Field, Ouachita County, Arkansas*

Productive area, acres	1,207.63
Average well depth, ft.	3,100
Average effective sand thickness, ft.	21.39
Arithmetical average, porosity, per cent	32
Average permeability, md.	2,772
Weighted average, connate water, per cent	10.6
Average residual oil saturation, per cent	28.5
Original solution gas-oil ratio, cu. ft. per bbl.	65
Solution gas saturation pressure, psi.	364
Original reservoir pressure, etc., psi.	1,280
Gravity oil, °A.P.I.	32
Reservoir volume, acre-feet	23,742.80
Maximum closure, ft.	205
Estimated recovery, bbl. per ac.-ft.:	
Pressure depletion	†378
Gas injection	800
Water flood	1,000

*Based on field development as of March 31, 1948. †Estimated economic limit as low as 330 bbl. per acre-foot.

Both gas and water were investigated as possible flooding media. Gas injection to maintain pressure at 350 psi. at which wells would continue pumping, would approximately double expected recovery, according to the study. Relative permeability of the sand to gas for increasing gas saturation was found to increase more rapidly than normal, a characteristic not favoring that method of pressure maintenance. In addition, gas repressuring or pressure maintenance would call for purchase of outside gas, unfavorable economically.

Water flooding showed several advantages over gas injection. It was therefore recommended and will be employed in the unit operation. The Nacatoch sand is being studied as a possible source of salt water for the project. Salt water will be injected in four or five wells located along the axis of the field at an initial rate sufficient to build up reservoir pressure to 1,500 psi. over a period of 15 to 18 months. That pressure will be maintained thereafter by proper balance of injection and withdrawal rates.

As pressure rises, producing wells will again flow, and pumping equipment presently installed will be reclaimed for other use. Producing costs will be further reduced by consolidating crude gathering to five central batteries, so located that produced water will move by gravity to the central water station. Produced water plus makeup water will be centrally treated and pumped to the injection wells.

Accurate records will be kept of input and withdrawal rates, individual well pressures, gas-oil and water-oil ratios, to provide a basis for a continuous reservoir study. The water-flood program will continue for an estimated 12 years, until field production reaches the estimated economic limit of 95 per cent water. On that basis, an oil recovery of 1,000 bbl. per acre-foot is anticipated, yielding 23,742,800 bbl. This sizable improvement over pressure-depletion recovery, coupled with the economy of unit operation should easily treble the net returns to be expected from total investment in the field. This partial combination of advanced engineering, geological, and legal practices will contribute substantially to the technique for improving this country's recoverable crude reserves.

TABLE 2—OPERATOR PARTICIPATION IN WESSON UNIT

Operator—	Productive acres	Productive acre-feet	Fraction of total acre-feet
Arkansas Fuel Oil Co.	26.50	365.31	0.01538614
Hassie Hunt Trust	62.92	1,423.51	0.05995544
T. W. Lee et al	209.77	4,355.21	0.18343287
McAlester Fuel Co.	588.81	12,010.05	0.50583967
Ormond Corp.	71.94	1,263.89	0.05323256
Root Petroleum Co.	98.48	1,942.73	0.08182396
Sohio Petroleum Co.	62.65	1,143.18	0.04814849
H. Spooner, Trustee	6.85	30.60	0.00128881
R. A. Stacy et al	78.86	1,205.39	0.05076865
Turner & Coan	0.85	2.93	0.00012341
Total	1,207.63	23,742.80	1.00000000

Petro-Chemical Operation

(Continued from page 66)

a very important solvent and chemical intermediate. Glycols may be formed, which are described as "dihydric alcohols," having two —OH or hydroxyl groups per molecule, such as CH_2—CH_2—CH_3, propylene glycol.

HO OH

As the molecular weight increases, the number of different derivatives possible increases rapidly.

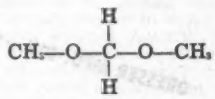
The output of the Celanese plant in 1947 more than doubled that of 1946. Actual production for 1947 is shown below as percentages of 1946 production:

Acetaldehyde	140
Acetic acid	167
Acetone	165
Formaldehyde	189
Methanol	144

New Chemicals Available

Many new chemicals have been made available commercially which a few years ago were to be had only in laboratory quantities. Production of n-propyl alcohol commenced in 1947 on a large scale, also isopropyl alcohol, prominent in chemical syntheses, as antifreeze, etc. Solvent No. 201, chiefly isobutyl alcohol, enlarged the supply of this product in the solvent and lacquer fields.

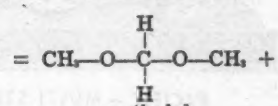
One of the recent additions to the chemical family put into tank-car production is methylal, or dimethoxymethane,



This material can be used widely to make formaldehyde, as a solvent for special organic reactions, and in inks, coatings, plastics, and varnishes. It may be considered as the product of the formation of two molecules of methanol, CH_3—OH, followed by dehydrogenation with, and combination with, a methane, CH_4, molecule.

$$2\,CH_4 + O_2 = 2\,CH_3OH$$

$$2\,CH_3OH + CH_4$$



methylal

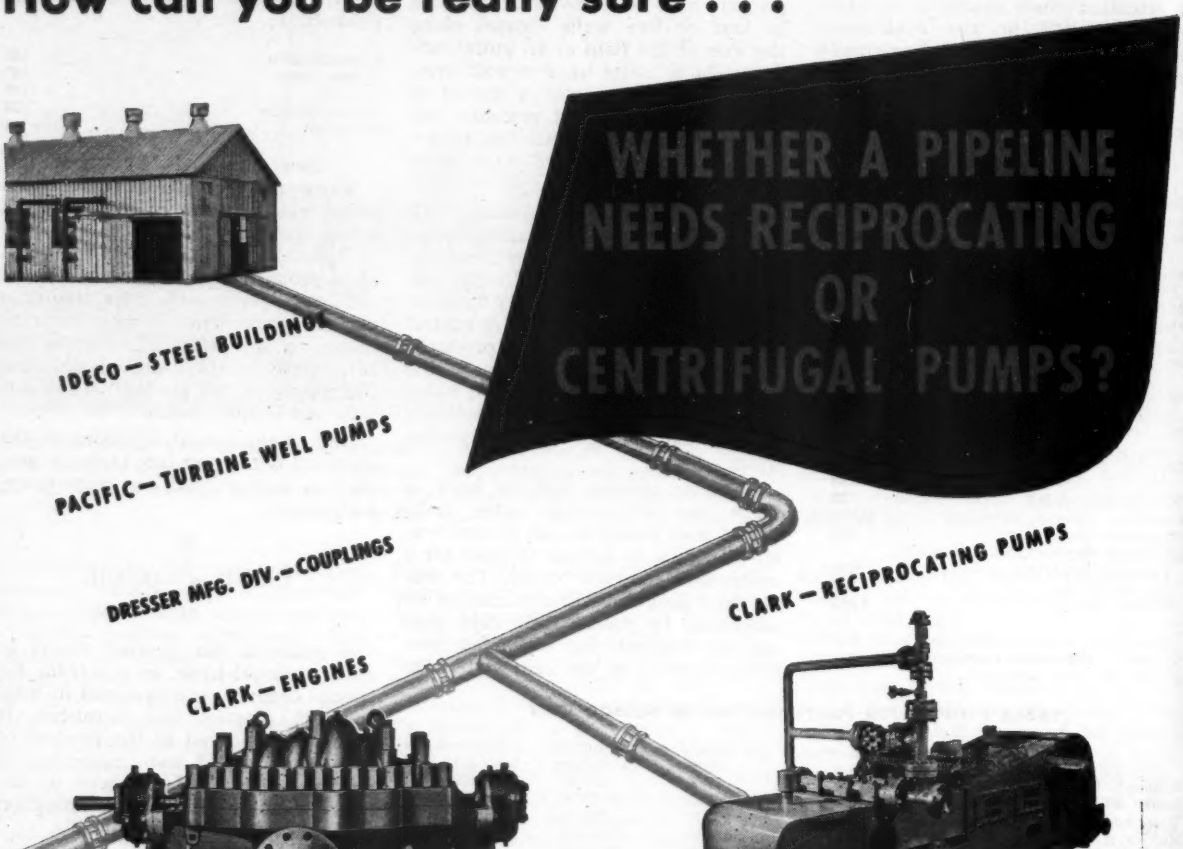
It is also finding application as an ingredient or special fuel additive in aviation fuels for special engines.

Tetrahydrofuran is another new chemical introduced in commercial quantities for the first time in this country. Made from acetylene and formaldehyde (in Europe) it is used as solvent, dissolving rubber, polystyrene, and the vinyl and cellulose plastics. Also a valuable intermediate for syntheses, it is in pilot-plant quantities now but is expected to be available in large amounts late in 1948.

The material 2-methyl-1,3-pentanediol is a new six-carbon glycol which is being studied intensively as a coupling agent, and solubilizer in pastes, cleaning and cutting oils, emulsions, and in making quick-drying inks for printing magazines and other such operations.

Propionaldehyde, which came into commercial stature in 1947, is useful and promising in the resin and plastics field, in solvents, pharmaceuticals,

How can you be really sure . . .


WHETHER A PIPELINE NEEDS RECIPROCATING OR CENTRIFUGAL PUMPS?
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PACIFIC — TURBINE WELL PUMPS
DRESSER MFG. DIV. — COUPLINGS
CLARK — ENGINES
CLARK — RECIPROCATING PUMPS
PACIFIC — MULTI-STAGE PUMPS

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STACEY BROS. Gas Construction Company
Cincinnati, Ohio

Stacey-Dresser Engineering Division
Cleveland, Ohio

and other commercial product syntheses.

Many of the chemicals formerly produced in cheaper and technical grades have been more highly purified and are now made in c.p. or equivalent grades, the results being traceable to improved fractionation and other methods of purification not perfected earlier.

Plant and Staff Growing

The Chemcel plant now occupies a site of 550 acres and employs nearly a thousand people. In addition, about 100 people are located at Clarkwood, just outside Corpus Christi, Tex., in the research organization. The plant has cost to date about $25,000,000 and still is being expanded. In addition to the main items of equipment and process units, the company found it necessary to build a large number of residences and other buildings for employes. The residences have been sold to employes.

Engine-driven compressors totaling 30,000 hp. are installed for the primary compression of process gases. Pumps and other equipment are driven by steam. One million pounds of steam per hour is the normal output of the plant. In the reaction processes some 200,000 gal. of propane and butanes are consumed each day.

Makeup water requirements are 3,500 g.p.m., and two large induced-draft cooling towers are installed to maintain the desired water temperature. For processing and cooling, the plant circulates 160,000 g.p.m. of water. Dry natural gas for fuel is consumed at the rate of 40,000,000 cu. ft. per day.

The present program at the plant is essentially a "consolidation of gains" process. It is three-fold: (1) Improvement of present processes; (2) investigation of other processes to make present products, and (3) development of derivatives, from present products, which are needed by industry. The greater part of this improvement program is being carried out, of course, at the research laboratories.

Among the chemicals which are being considered for production in future may be included pentaerythritol, a valuable and much used product in many processes and synthesis in several industries.

Economics of Aerial Magnetics

(Continued from page 71)

If shoran surveying is not necessary, a smaller and slower plane can be used. There are lower limits, however, based on carrying capacity. The minimum plane crew is three men, pilot, navigator, and the magnetometer operator. The magnetometer equipment, including the cable reel for the "bird," must be carried, as well as sufficient fuel to allow a good operating range from the nearest suitable base for the plane. Probably the minimum-sized place would be the equivalent of the Army AT-11 two-engine trainer.

Still another factor is involved in figuring the minimum-sized area economically feasible for aerial magnetics. The magnetometer is a reconnaissance instrument. The magnetic picture of a very small area is apt to be meaningless, except as a part of a regional picture. Hence on small tracts, the area over which the magnetic recordings must be made is almost invariably larger than the tract to be covered. Just how much larger an area must be covered depends on several factors. Certainly an important factor would be the amount of general knowledge already available about the broad regional magnetic picture in that particular area.

It is of course possible that as time passes, broad regional magnetic maps may become fairly commonly available. Today regional geologic maps are rather freely available, and even regional gravity maps are sometimes available. If eventually a similar situation should develop as to regional magnetic maps, it should result in a decrease in the size of tract economically available for more intense magnetic checking. The smaller the area economically feasible for checking, the more the market for aerial magnetic work should expand.

BOOKS

MANUAL OF ENGINE TEST METHODS FOR RATING FUELS. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia, 320 pp., 109 illustrations. $8.

This manual includes in concise form the five engine test methods employed throughout the country for the determination of antiknock ratings of motor and aviation fuels. Six supplemental chapters give details of design of laboratory equipment and facilities, operation, and maintenance. Emphasis has been laid on details of design, on simplicity of expression. The manual has been prepared with the purpose of making a useful reference compendium for the executive and the supervisor, for those training operatives and technicians, and for persons testing fuels and maintaining the equipment therefor. The information contained will aid the laboratory executives to plan and design engine laboratories and to help those operating test equipment.

MANUAL FOR PROCESS ENGINEERING CALCULATIONS. By Loyal Clarke. Published by McGraw-Hill Book Co., New York. 438 pp.

Replete with mathematical tabular data in extenso in many instances, this volume of 13 chapters should prove of considerable usefulness to the design engineer who must compute the innumerable details of fabrication or specification for the many items of equipment employed in petroleum, chemical and other industries building and operating such equipment. A chapter is devoted to mathematical tables in common and wide use; a second chapter includes 16 conversion tables, some augmented by curves and nomographs for ready use by the engineer.

Physical and mechanical properties are treated in 28 tables, most of them exhaustive enough to meet practically all needs. Thermodynamics data are given in a chapter replete with curves and nomographs with 20 tables and 23 figures, dealing with latent heats, vapor pressures, properties of steam, ammonia data, etc. Flow of fluids in pipes, hydraulics and related matters are discussed briefly, with much tabular material of direct use. Similarly heat transfer, one of the most important factors in process design and operation, is covered briefly but pertinently.

Among equipment items discussed are pumps; fans, blowers and compressors; distillation and distilling; absorption and stripping equipment. All the discussion is supported by tabular and nomographic aids, sample calculations, etc., of use especially to the relatively inexperienced engineer.

INDEX TO A.S.T.M. STANDARDS. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 246 pp.

This publication is really an adjunct to the society's big 1946 Book of Standards (6,600 pages) and the 1947 Supplements (1,800 pages) and enables any of the some 1,500 standard specifications and tests in the volumes to be located readily. The Index is also of service to those who wish to determine whether A.S.T.M. has issued standard specifications, or definitions covering a particular engineering material or subject. All items are listed in the Index under appropriate key words according to the particular subjects they cover.

ANNUAL REVIEW OF CALIFORNIA CRUDE-OIL PRODUCTION. Published by Conservation Committee of California Oil Producers, Los Angeles.

This is the sixteenth year that the Conservation Committee and its predecessor organization have issued an annual review of the activities of the committee and statistical information relative to crude-oil production. The volume reviews both the oil-production and natural-gas situations, listing principal fields, price changes, development drilling and exploratory wells, demand, and many other facets of the industry. The data are largerly in tabular form, interspersed with charts and graphs.

ANALYSES OF CRUDE OILS FROM 283 IMPORTANT OIL FIELDS IN THE UNITED STATES. By C. M. McKinley and O. C. Blade. Published by U. S. Bureau of Mines, Washington, D. C. 154 pp.

This Report of Investigations No. 4289 presents analyses of crude oils from most of the fields in the United States producing 2,500 bbl. per day or more. On January 1, 1947, there were 340 fields producing 2,500 bbl. a day or more. Fifty-seven fields have been omitted because the bureau did not have analyses of the crude oils being produced. As one sample was not representative of the production from several of the fields, two analyses are given for each field of this kind. The report provides a means of ready comparison of the properties of crude oils from different areas of the United States. All analyses were made by the B. of M. routine method, which has been used in the same essential particulars for over 25 years.

WHO, ME?—POINTERS IN JOB MANAGEMENT. Published by National Foremen's Institute, Inc., Deep River, Conn. 24 pp. 25 cents.

This pamphlet has been prepared as a brief, handy guide for all supervisors—division, department heads, and foremen—for achieving better human relations. It is not intended to supplant existing company policies and regulations but is meant as a convenient digest of the purpose and thought behind the personnel-management program.

Year in -

LEE C.

Moore

JOURNAL-*Guide* TO

Jordan Ellenburger

Ector County, Texas

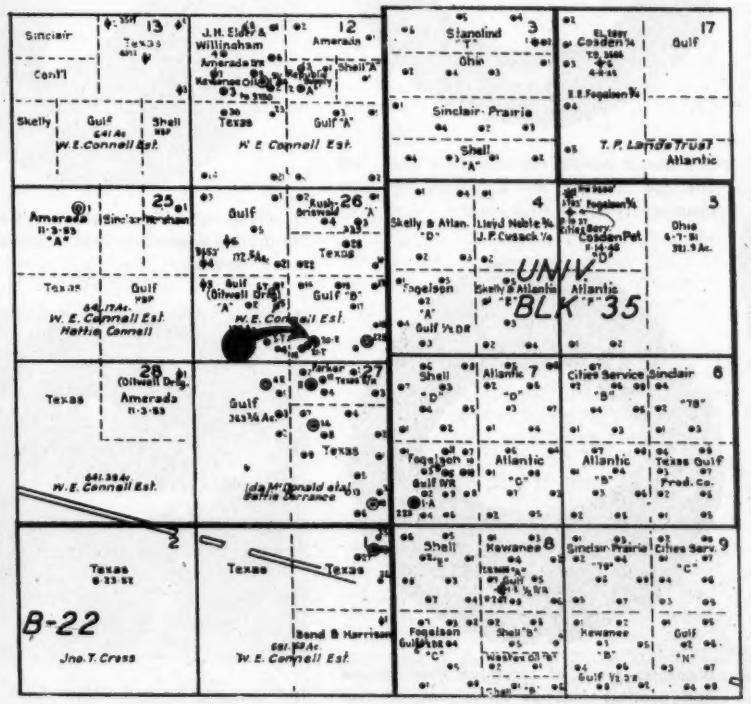
THE Jordan Ellenburger field in southern Ector County is rapidly shaping up as one of the major producing areas of the West Texas Permian basin. At this time five rigs are running and two locations are staked.

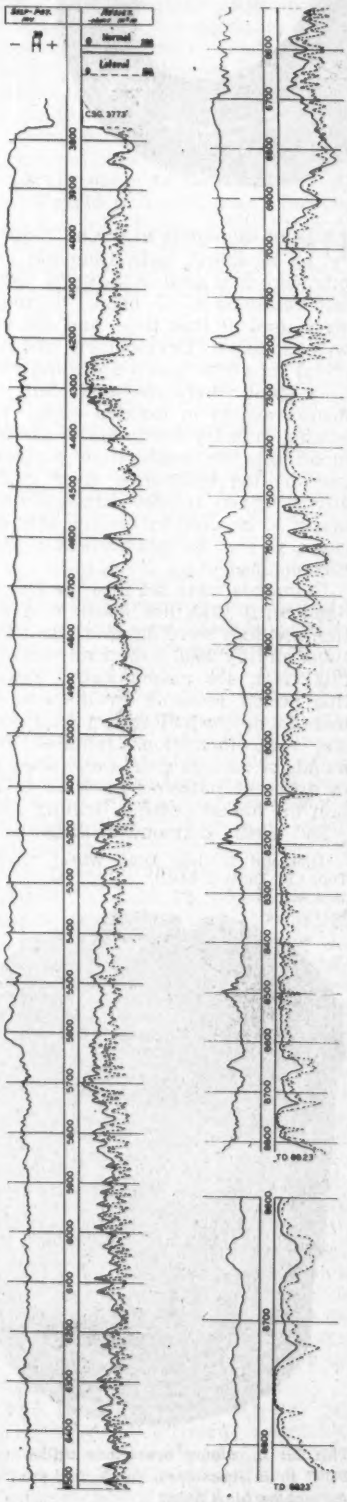
Pays.—Ellenburger production is found around 8,800-50 ft., in which most completions are made without acid, and initial potentials run as high as 1,000 bbl. of 44°-plus oil. The Ellenburger wells are in addition to shallower production in the Permian, and a recent completion in the Tubb zone (817 bbl. initial potential, 5,242-70 ft., total depth), added a third pay to the area and obtained a new field designation.

Casing and bits.—Standard casing pattern had not been set for the field at this writing. Gulf Oil Corp. 20-E W. E. Connell "B," Section 26, Block B-16, northwest extension, ran the following pipe: Cased 13⅜-in. to 738 ft. with 600 sacks; 9⅝-in. to 3,757 ft., 2,100 sacks; 7-in. to 8,776 ft., 1,150 sacks. Completion was from open hole pay between 8,800-46 ft., total depth. Rock bits have been used throughout. Number and size on the 20-E Connell were: Two 17½-in., eighteen 12¼-in., ninety-eight 8¾-in., and two 6-in.

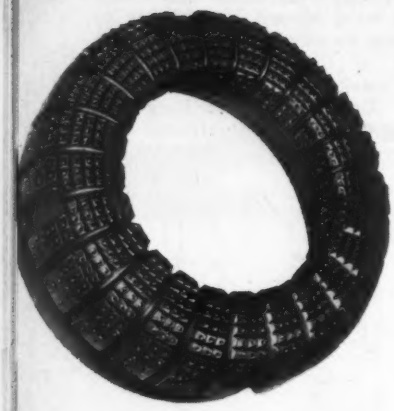
Contract terms.—Contracts are usually on a footage, plus daywork basis, with operator preparing location, supplying fuel, mud, cement, and water on some wells. Contractors supply substructure and derrick. Power rigs are used but local gas is not enough for drilling.

Drilling conditions.—No special problems have been met in drilling, except hard formation, mostly below 7,000 ft. There have been no lost circulation problems and no heaving or caving shale. High-pressure gas has not been encountered, but some wells report high-pressure air in a salt section between 1,000-1,500 ft. In this section, difficulty is experienced in keeping drilling fluid in the hole. Some wells have shown a tendency to develop crooked hole on the east flank of the structure. Drilling time breakdown (days) on this well was: Rigging up 3, drilling 129, casing 9, total 141. Contractor was Dixilyn Drilling Co., Fort Worth.





Black arrow on map shows location of well represented by electric log at right (Map courtesy Southwest Mapping Co.)



Diamond Bits

by Patrick Adamson*

USE of diamonds in the oil fields is by no means new. Diamond drill bits were first used in the early 1920's, but carbonados, or black diamonds, were used at that time, and the cost was excessive. Development of hard-metal rock bits lowered drilling costs to a point where diamonds fell into disuse, except in isolated cases. The mining industry continued to use diamond bits for exploration purposes, and drilling techniques were gradually improved. In 1926 industrial bortz began to be used in drilling bits, because it was so much cheaper than carbonados.

Diamonds were set into the bits by hand until 1930, but mechanical setting methods were devised about that time, and by 1938 almost all diamond bits were set mechanically. During this period research by diamond-bit manufacturers had shown that various rock formations required diamonds of various grades and sizes, set in different patterns, in order to attain the lowest possible drilling costs.

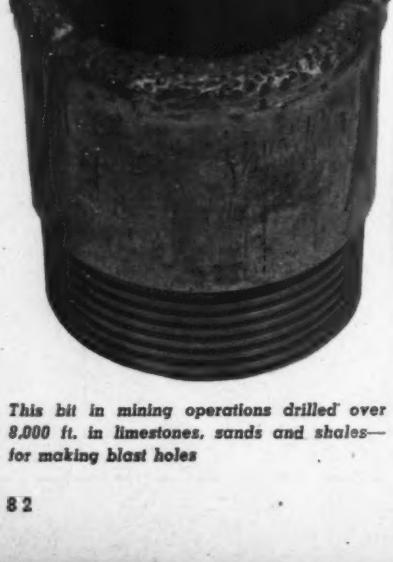
By 1942 diamond-drilling techniques had improved to a point where very deep holes had been drilled for exploration purposes; and while depths of over 2,000 ft. were rare, yet the deeper holes, up to 10,000 ft. in one instance, had been completed successfully. It thereupon became apparent that these new and comparatively cheap methods might have an application in the oil fields. Tests were undertaken by Shell Oil Co., Inc., in conjunction with Wheel Trueing Tool Co. at this time, and were continued in various localities with a view to developing suitable types of bits and operating techniques.

While the basic principles of diamond drilling remained the same, it was found that many modifications were necessary because of the different operating conditions. For example, in conventional diamond drilling the bit is advanced either by a screw-feed mechanism or by a hydraulic feed, both of which force the bit into the rock and put the drill pipe into compression. In the oil field the drill pipe is held in tension, and mechanical feeding devices are not readily available on many rigs. Although diamonds are many times harder than any other known substance, they are brittle, and will not withstand either overloading or percussion. It was therefore necessary to drill with light weights, as compared to rock bits, and to feed the line off the drum

*Diamond Drilling Div., Wheel Trueing Tool Co., Detroit, Mich.

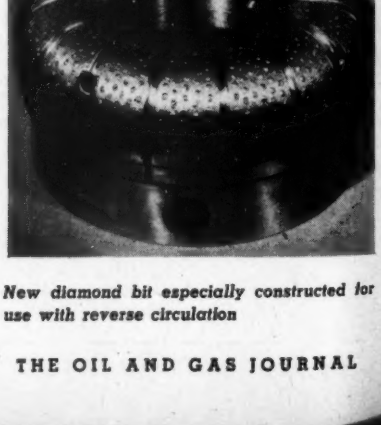
Bits should not be run over junk iron. This one has suffered lost diamonds and has been grooved from such cause

An 8¾-in. bit which takes a 4⅞-in. core. The drilling design has kept diamond weight to a minimum



This bit in mining operations drilled over 8,000 ft. in limestones, sands and shales—for making blast holes

Illustrates result of excessive fluid volume and possible kink in lower end of core barrel



New diamond bit especially constructed for use with reverse circulation

very evenly, so that as constant a weight as possible was kept on the bit at all times.

The general trend in diamond drilling has been towards ever-increasing rotational speeds, and the general design and pattern of diamond bits in the mining industry have conformed to that trend. Speeds under 400 r.p.m. are seldom used, and in short-hole underground operations speeds up to 4,000 r.p.m. are used. It was therefore necessary to make careful computations of the most effective speeds in various rock formations, using various-sized bits, until a formula was obtained which would give the most effective lineal speed at the periphery of the bit. The answer, when obtained, was not very helpful, because it showed that bits of conventional design would have to be rotated at speeds above those generally available on oil rigs. The pattern and size of the diamonds were changed, so that effective cutting could be expected within a range of 50 to 150 r.p.m.

Circulation Important

Diamond drills use water as a circulating fluid, and the pressure at the bit face need only be sufficient to keep the bit cool and wash away the cuttings. The volume of fluid passing over the bit is not considered. Water pressures vary from 40 to 200 psi., and although the cuttings are sometimes abrasive they do not present a serious erosion problem. In using water-base, or oil-emulsion, muds, and particularly those of high viscosity and jel strength, the circulation passages had to be redesigned in order to allow the necessary volume of mud to circulate, and at the same time obtain sufficient pressure drop across the face of the bit to clear the cuttings without eroding the matrix. When oil-base muds, or crude oil, are used a further problem arises in that the cuttings combine with the fluid to form a sticky paste which tends to clog the circulation passages unless high velocity is maintained. This, in turn, increases the danger of cutting the matrix by fluid erosion, or of burning the diamonds in the areas where circulation is sparse due to clogging.

The greatest hazard of all, however, is the presence of junk iron in the hole. Any small piece of metal on bottom is liable to wreck a diamond bit; and most of the standard hole-cleaning devices, while they will remove a high percentage of junk present, are apt to miss a few small fragments. If these fragments are unable to pass the junk grooves provided on the outside dimension of the bit face, they will almost certainly cause damage. Furthermore, junk fragments can stick to the walls of the hole, and there is always danger in open holes that these may be dislodged by the bit while going into the hole, so that they get underneath it.

If the metal particles are held immovable in some fashion there is a good chance of the diamond bit cutting through them without being damaged; but such a happening is rare. In one such case a tong die was cut in half, and part of it recovered in the core barrel, while the bit appeared none the worse for wear. The penetration speed, however, did not break any records during this operation. On another occasion a cone from a roller bit was recovered in a similar fashion. But for the most part any junk on bottom will roll around with the bit and gouge a ring around the circumference of the cutting face. With the diamonds gone in a ring, the rock comes in contact with the matrix metal, and unless the bit is picked off bottom it will be completely destroyed in a very few minutes.

It is possible to pick up a diamond bit from bottom almost at the moment that it starts to break down. The circulation passages, or fluid grooves, are evenly spaced around the face of the bit, and while drilling is in progress the pump pressure, as shown on the gage, remains constant at whatever reading has been established. The moment breakdown occurs a small groove is formed on the bit face, and this has the effect of constricting the circulation passages and increasing the pressure. This shows in an immediate jump on the pressure gage, usually as much as 100 psi. If the bit is pulled right away only a very few diamonds will have been destroyed, and the recovery will be high. That means that the majority of the diamonds can be removed from the matrix and used in another bit. This invaluable indication of breakdown will only prove reliable when the pump volume is kept absolutely constant. This should be under constant check during the entire coring operation.

Diamond Losses

The percentage of diamonds recovered out of bits varies in accordance with the promptness with which the bit is picked off bottom in case of breakdown; the care with which it has been fed during the drilling period; the formation being drilled; and the quality of the diamonds being used. Even if the bit is picked up at the proper time, and almost all of the diamonds appear to be in place, after they are removed from the matrix a certain number will break up into small fragments. If they have been overloaded by irregular feeding off the drum, or subjected to percussion due either to vibration or bouncing the bit on bottom, a large proportion of them will be fractured in several directions, and only held together by the matrix metal. Fractures in the formation itself will have a similar shattering effect; while cheaper-quality diamonds may either have incipient fractures already present or, because of their irregular shape, be prone to fracture more easily than better-quality stones.

When drilling crews first begin to use diamond bits the danger of accident, and even of total destruction of the bit, is a factor to be considered; and for this reason it is as well to use inexpensive diamonds, or obtain the services of an engineer with previous knowledge of the necessary techniques and procedure. In fractured formations, and in drilling chert, there is also danger of heavy diamond loss, and so the same reasoning applies. In favorable drilling conditions, with experienced crews, better-quality diamonds are likely to show the lowest costs. Provided the diamond loss is small, the initial cost of the bit is a secondary consideration compared to the bit cost per foot drilled, the footage made per hour, and the length of time on bottom.

In one set of comparative figures better-quality bits drilled twice as much footage per bit as a cheaper grade, and cut the bit cost per foot in half. Moreover, the percentage of recovery was higher, which means a conservation of valuable material. It was not apparent that the footage cut per hour was any better, although in theory this should be so.

Techniques for Coring

The technique of running diamond coring bits is comparatively simple, now that most of the problems of design, manufacture, and operation have been ironed out. No special equipment is essential, although certain refinements may be desirable such as more accurate weight indicators, automatic feed controls, and even electrically operated alarm gages for mud pumps and torque, which would draw the driller's attention to any deviation from the normal.

The bit is held 12 in. off bottom during the preliminary circulation period. The volume is then set at the predetermined rate and the rotary started at approximately 40 r.p.m. The bit is then lowered until it takes about 1,500 lb. of weight, as shown on the weight indicator, and allowed to settle into bottom for 3 or 4 minutes. The weight is then increased up to 3,000 lb. and the rotary is accelerated up to the proper drilling speed, which varies with different size bits. Twelve inches are drilled with this light weight, to make sure that the first part of the core is cut perfectly straight until the stabilizer at the bottom of the core barrel, immediately above the bit, has been buried. In certain cases this process may be desirable for the first 3 or 4 ft. The correct weight is then applied, and the coring operation is under way.

The most effective weight and r.p.m. vary in different formations and under different sets of conditions. A certain amount of trial and error, changing both weight and rotary

speed up and down, will be necessary to establish the maximum efficiency of operation. It must be remembered that the weight on the bit, regardless of the weight-indicator reading, is controlled by a variety of factors such as drag, crooked hole, mud condition, and so on. The important thing is that the weight should be applied smoothly at all times, and held constant during the trial periods and, of course, during the subsequent drilling. The vernier hand on the weight indicator is most useful in keeping the weight within close limits.

When the conditions are appropriate for drilling with diamond bits, either for core recovery or for penetrating extremely hard formations, the savings in footage cost and drilling time will be very considerable, as compared to conventional methods. Despite the savings that have already been achieved in various formations, it is hoped that further reductions can be effected in the near future, and experimentation is going on with this end in view. One possibility is continuous coring by means of reverse circulation. In formations where this is permissible, where crude oil or emulsion muds can be used, and where the conditions are generally favorable, it should be possible to keep a bit on bottom throughout its entire life. Elimination of round trips every 50 ft., or as directed by the length of the core barrel, and reduction of wear on equipment should show very considerable savings in drilling time and maintainance costs.

Reverse Circulation

Conventional coring with reverse circulation has not been universally successful in the past, although there have been exceptional cases where it has proved a boon. One of the difficulties has been that conventional cores are liable to break up into pieces of irregular size and shape. This disturbs the even flow upward, and bridging can occur in the tubing. Diamond-bit cores are perfectly smooth, cylindrical, and symmetrical; and so they are ideally suited to this purpose. Where the correct clearance between the diameter of the core and the minimum diameter of the tubing is maintained many of the previous difficulties are avoided.

Although it has been suggested that diamond-bit cores might be brought out through a special swivel, as has been done in the past, using conventional bits, the fact that diamond bits cut long unbroken cores would necessitate some core-breaking device below the swivel, or else they might get stuck. The cheaper, and perhaps more practical, method is to incorporate a core receiver below the kelly in the form of a joint of pipe of somewhat larger diameter than rest of the tubing or drill pipe. The bit has to be raised off bottom every 30 ft. or so, in order to add another joint of tubing, and this automatically breaks off the core and retains it in the core catcher and immediately about the bit. This accumulation will later be washed to surface, and therefore a core receiver below the kelly need only be a little over 30 ft. long, of suitable diameter, and fitted with a finger-type core catcher at the bottom end to prevent cores slipping back, once they are in the receiver.

Catcher Details

A cross bar at the top prevents cores being washed out at that end. The receiver can be emptied whenever a joint of pipe has to be added; and in one test the additional time required for this operation proved to be only 3 minutes. The moment core enters the receiver the fluid commences to bypass it, owing to the increased inside diameter. Up to this point, however, the fluid pressure on the base of the core, when the diameters are in correct ratio, is more than sufficient to give the necessary lift. In one particular test the pressure on the base of the core, after due allowance for slippage and bypassing, was calculated to be enough to lift nearly 60 ft. of core, figuring in this case 7 lb. weight per foot of core; and so an ample safety margin was present during the operation. On another test 399 ft. was cored in 4 days, with 100 per cent recovery, in hard sandstone. One bit only was used, and no round trip was necessary from start to finish.

The perfecting of reverse circulation technique with diamond bits may be vitally important where drilling speed is a prime essential. Where core is not required it will give the same effect as drilling with a solid bit; and the resultant cores will have been obtained at no extra cost.

Solid bits, which have diamonds set over the entire face, have certain disadvantages. The diamond weight, and therefore the cost of the bit, is greatly increased. Moreover, the difference in lineal speed between the diamonds at the periphery and those at the center is so great that both parts of the bit can hardly work efficiently at the same time. This difficulty arises to a much lesser extent in mining bits used for blast hole drilling and other operations where cores are not required. The type in general use are only 1½ in. in diameter, and so the differential in lineals speeds is much smaller. They are rotated at high speed, thus the center stones, though traveling more slowly than the outside stones, still have cutting speed.

In the case of 6-in. bits, or larger, rotating at under 100 r.p.m., while the outside stones have cutting speed the center stones are virtually standing still. The result of this is that the outside stones cut themselves free, and the center stones then take all the weight and may break down from overloading. Bits have been designed which overcome these factors to some extent, but the difficulties have not been entirely eliminated.

Experimentation is also going ahead on diamond reamers, which will follow the standard 6⅛-in. diamond bit and open up the hole to any required size. This is an equally important development, as it will permit the use of diamond bits in many wells where hard and abrasive formations are encountered, but where it has not been thought expedient to use oversized diamond bits. At the present time there are many wells where 6⅛-in. bits have been used to drill ahead, but because it is desired to set 7-in. casing, or because a larger hole is ultimately required, a reaming operation with rock bits follows the diamond-bit drilling. Even where the diamond bits show great savings, the initial advantage is more than offset by the expense of the subsequent reaming operation.

By using a diamond reamer above the core barrel it is hoped to take advantage of the fact that a reaming action is easier on diamonds than a direct cutting action, so long as the reamer is specifically designed for that purpose. This has been proved in the mining field, where tapered reamers are used quite frequently, and have shown themselves to be both effective and economical. It is common to have a reamer cut as much footage as would have worn out 20 bits, used in the same way.

Reamer Advantages

The reamer which it is hoped will prove effective in the oil fields in screwed to a special sub above the core barrel, and is detachable. There is a further advantage in breaking up the diamond area into two or more parts, because if one section will outlast another only the worn section need be replaced, and there is a saving in the cost of setting, or resetting, the diamonds. In addition to any consideration of cost, once the reamer is buried it acts as a very efficient stabilizer at the top end of the core barrel, and in this capacity will prolong the life of the diamond bit, which needs good stabilization at all times.

There has already been a successful development in the use of diamond coring bits up to 8⅞ in. in diameter, taking very large cores. At first opinions were expressed that these cores might prove difficult to break off, and awkward to handle in the core barrel due to the high ratio of weight per foot of core; but these fears have definitely been unfounded. As the outside diameter of the bits increases, so the core size should be increased. Otherwise the diamond area would become so great that the price of the bit could reach a point where its use was no longer economical. Moreover, the differential between the outside and inside lineal speeds would approach the limit be-

(Continued on page 107)

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PIPE INSULATION

AT TIDE WATER ASSOCIATED'S BAYONNE REFINERY

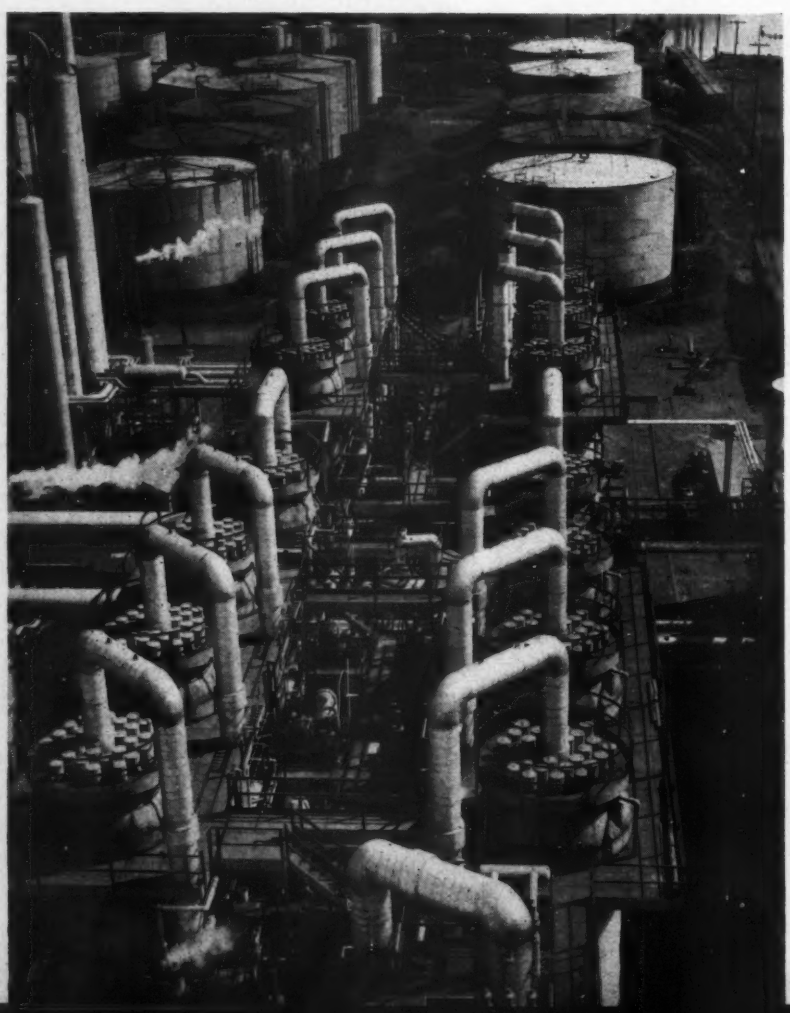
by Utley W. Smith

REGARDLESS of the processes utilized or the products made at a refinery, a large part of its equipment consists of pipe lines used to transmit heated materials such as oil, steam, etc. Refinery piping, generally many miles long and running over acres of land, is completely exposed to the weather. At Tide Water Associated Oil Co.'s Bayonne, N. J., refinery, ambient air temperatures drop to 5° or 10° below zero and air velocities go as high as 30 to 40 m.p.h. Heat losses from pipe lines under these conditions are much larger than would be the case with indoor equipment.

Lack of insulation or inadequate insulation on piping, valves, or fittings makes it very difficult, if not impossible, to maintain line temperatures within the limits necessary for the proper functioning of equipment such as stills, strippers, or cracking units. In the case of steam lines, inadequate insulation combined with low air temperatures and high winds greatly increases condensation. Water-hammer vibrations caused by slugs of condensate, especially in high-pressure, small-diameter piping, can result in large leaks around fittings and flanges and may even damage them. With steam-driven equipment, such as turbines and pumps, wet steam causes severe scoring of turbine and pump impeller blades and appreciable power losses.

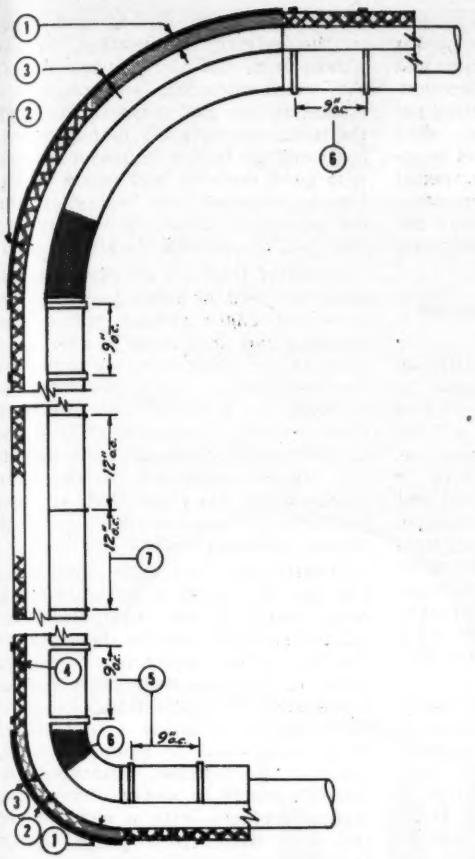
Utley W. Smith, a native of New England, is a graduate of M.I.T. and holds a B.S. degree in engineering and business administration. For a number of years, he was associated with Johns - Manville Corp. as engineer in charge of manufacturing specifications. In 1942 he joined the War Production Board, first as assistant chief, and later as chief of the asbestos section. After terminating his work with WPB he became manager of the Magnesia Insulation Manufacturers Association, comprising the major producers of 85 per cent magnesia insulation in the country. In addition to his managerial duties for the association, Smith is engaged in a series of studies on the economics of thermal insulation and is active both as a speaker and as a writer on various aspects of industrial thermal insulation problems.

Catalyst chamber piping of Houdry unit at Tide Water's Bayonne refinery. Pipe insulation is covered with 55-lb. asbestos felt held in place with stainless-steel strapping



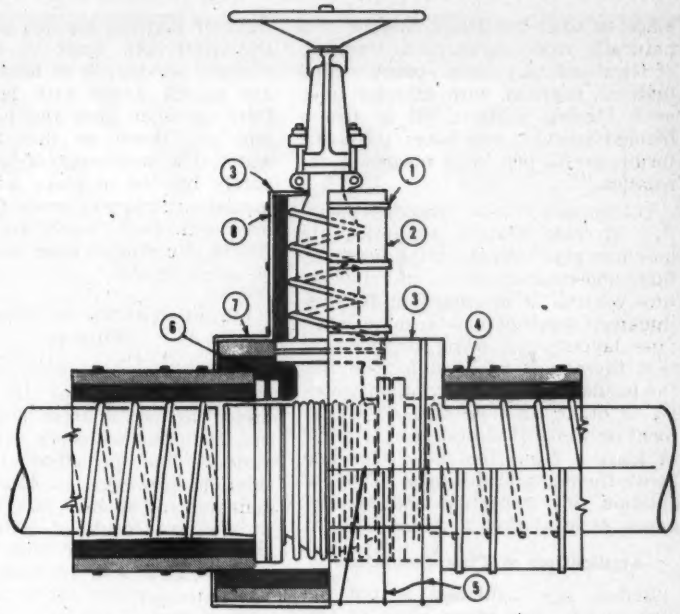
With oil lines, uninsulated flanges can be a serious fire hazard. In a number of instances, bare flanges overheated by a fire nearby have sprung leaks and spurted oil which took fire and spread the blaze over the entire line. Insulation would probably have protected the flanges from the heat long enough for the fire to be put out. On large equipment, flanges have been known to fail because of unbalanced stress conditions due to differences in temperature between insulated piping and uninsulated flanges.

Another critical piece of equipment requiring insulation in steam-traced or wrapped piping, that is, piping around which a ½ or ¾-in. steam pipe is wrapped spirally, the number of spirals per foot varying with the size of the process line. A wrapped line at the Bayonne refinery serves the Houdry catalytic cracking unit,



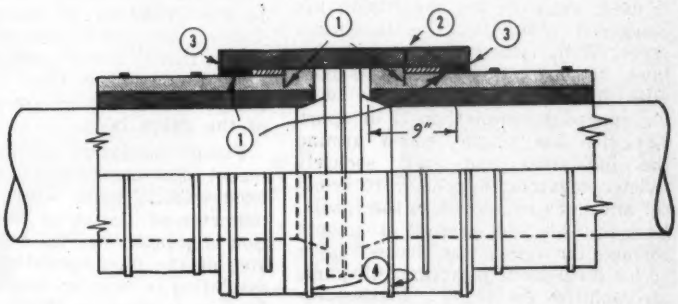
Pipe insulation for outdoor installations

1—Pipes up to and including 6-in. diameter are covered with insulating cement built up to a thickness equal to that of the adjacent insulation. 2—A ¼-in. layer of weatherproof, fire-resistant plastic. 3—A ¼-in. layer of insulating cement. 4—Jacket of 55-lb. asbestos felt. 5—A ½ by .015-in. 18-8 stainless-steel insulation strapping. 6—Single-loop No. 14 W. & M. soft annealed G. I. wire 12 in. O.C. 7—Insulation on ells and bends is covered with a layer of No. 19 W. & M. Ga. 1-in. hexagonal wire mesh



Steam wrapped valve insulation for outdoor installations

1—½ by .015-in. 18-8 stainless-steel straps and seals. 2—Valves under 2 in. in size are covered with insulating cement and finished with 55-lb. asbestos felt jacket. 3—Fifty-five-pound asbestos felt jacket. 4—Pipe insulation, jacket, bands, etc. 5—Each layer is wired on with No. 14 soft annealed G. I. wire. 6—Voids filled in with scrap cement. 7—Weatherproof, fire-resistant plastic. 8—Quarter-inch layer of insulating cement



Flange insulation

1—Voids filled with scrap insulation. 2—Fifty-five-pound asbestos felt jacket. 3—Ends finished with weatherproof, fire-resistant plastic. 4—½ by .015-in. 18-8 stainless-steel strapping

and carries a high-melting-point material used as a cooling medium in the cracking equipment. If the piping as well as all valves, fittings, and flanges were not adequately insulated, the material would solidify and plug the line.

In short, the operating efficiency of refinery piping depends to a great degree upon its insulation. Tide Water Associated Oil Co. therefore gives careful consideration to its pipe insulation, application, and maintenance.

Lines operating at temperatures below 600° F. are insulated with 85 per cent magnesia, a material consisting of 85 per cent magnesium carbonate combined with asbestos fiber and molded into blocks, semicylindrical, or segmental sections.

Where lines operate at temperatures above 600° F., a combination is used consisting of an inner layer of diatomaceous silica insulation thick enough to reduce the temperature at its surface to below 600° F., and an outer layer of 85 per cent magnesia. Diato-

Turbogenerator piping at Tide Water's Bayonne refinery. Pipe insulation is covered with a layer of heavy rosin-sized paper. Over the paper is a sewed-on 6-oz. canvas jacket that is sized and painted

maceous silica insulation consists of a naturally occurring material made up of fossilized microscopic plants called diatoms, together with asbestos fiber as a binding material. It is also a molded product and takes the same forms as 85 per cent magnesia insulation.

Thicknesses of pipe insulation specified at Tide Water's refineries are based on pipe size, operating temperature, and desired extent of temperature control. It is important to keep thickness specifications in mind when pipe layouts are being designed so that there will be enough room for the insulation on pipes running parallel to other lines or next to equipment or walls. It is desirable to allow at least a 3-in. clearance, over and above the nominal thickness of the insulation, for inspection and maintenance of insulation.

Application of Pipe Insulation

Before any insulation is put on, pipe surfaces are wiped clean of any dirt, debris, or grease. The pipe sections in either semicylindrical or segmental form are applied and butted closely together. Both side and end joints are staggered as much as possible. Where double-layer insulation is used, joints in the outer layer are staggered with those in the inner layer. With either single or double layer, the insulation is wired in place with 14-gage galvanized-iron wire ties spaced not more than 12 in. apart. The ties are single looped around the insulation and ends securely twisted together. Surplus wire is cut off and ends imbedded in the insulation in order to present a smooth surface for either the second layer or for subsequent jacketing. All joints are pointed up with insulating cement before a second layer or jacketing is applied.

When process piping is wrapped with a steam line, a layer of galvanized expanded metal lath is placed over the wrapped piping in order to obtain a secure foundation for the insulation. The lath is laced in place with 16-gage galvanized-iron wire on 12-in. centers.

Indoor pipe insulation is covered with a single layer of heavy rosin-sized paper wired on in the same way as the insulation, except that 16-gage wire is used instead of 14. Joints in the paper are lapped at least 2 in. both circumferentially and longitudinally. Over the paper a 6-oz. canvas jacket is applied and sewed in place with approximately four stitches per inch. The canvas jacket is then sized and painted.

Outdoor insulation is protected by a weatherproof, fire-retardant jacket. The jacket is composed of a sheet of asphalt-saturated asbestos felt cemented to an unsaturated asbestos sheet. This jacket is applied with the asbestos side exposed to the weather and the asphalt side against the insulation. Ends of the jacket sections are lapped at least 2 in. and are pasted down with lap cement. Care is taken that the longitudinal laps are down so that they shed water. The weatherproof jacket is securely banded in place with special insulation strapping made from stainless steel. Such bands are more resistant to corrosion than ordinary iron or steel bands.

Insulation of Valves, Flanges and Fittings

Valve, flange, ell, bend, and fitting insulation thicknesses are equal to those on the adjacent piping. Also the insulating materials used are the same as for the adjacent pipe insulation. However, on lines 6 in. in diameter and smaller, ells, bends, and fittings are insulated with cement, while on lines larger than 6 in. they are insulated with semicylindrical or segmented sections cut to fit the contour of the particular piece. Valves and flanges are all insulated with pipe insulation regardless of the size of the line.

Insulation is placed over valve body flanges and overlaps the adjacent pipe insulation a distance equal, at least, to the thickness of insulation used. Valve body and bonnet insulation is cut so that it can be applied in three pieces, one piece over the bonnet flange and one piece over each end of the valve body.

Flange insulation overlaps the adjacent pipe insulation a distance of at least 4 in. In cases where the inside diameter of flange or valve insulation is greater than the outside diameter of the pipe insulation, the pipe insulation is built up with either diatomaceous silica or 85 per cent magnesia. Voids between valves and flanges and the insulation are filled in with insulating cement.

Molded insulation on flanges, valves, ells, bends, and fittings is wired on the same way as pipe insulation and the finish used is the same as that on the adjacent piping.

On all ells and bends, a layer of 19-gage 1-in. hexagonal-mesh galvanized wire netting is applied over either cement or pipe insulation, before the finish, whether canvas or weatherproofing, is put on. For ells, bends, and fittings exposed to the weather, a ¼-in.-thick weatherproof, fire-resistant, plastic coating is used instead of the asbestos felt jacketing. This plastic coating is also used to point up the ends of flange and valve insulation that is exposed to the weather. Care is taken that the junction of the asbestos felt jacket on pipe insulation and the plastic coating on ells and bends is made weathertight.

Insulation Maintenance

Probably the most important cause of insulation damage to pipe lines in the refinery is weather. Severe winds, rain, and snowstorms rip off the weatherproofing and cause the insulation to get soaked. Although the insulation is rarely damaged seriously enough to require major repairs, it is good business and smart operation to keep both the insulation and the protective jacketing weathertight and in top condition at all times.

Insulated lines are checked periodically for torn or loose jackets. Corners and edges around valves and fittings, and insulation saddles and hangers are checked to see that they are weathertight. Damaged weatherproofing is removed and replaced. Care is taken to seal the ends of the patches with lap cement; loose jackets are tightly cemented down. Any points along the line that are not weathertight are pointed up with plastic weatherproofing.

Construction workers sometimes damage insulation with scaffolding, while installing new equipment. Insulated surfaces may be damaged by passing mobile equipment, dropped tools, or because they are used as ladder supports. These things are most likely to occur during a turnaround when equipment is being removed, repaired, or installed. Damaged insulation should be sawed off and the section replaced with a new one of the same shape. New pieces should be wired on securely, cracks pointed up with insulating cement, and the protective covering replaced.

Sometimes the cause of mechanical damage cannot be eliminated. For instance, an insulated line may be rubbed by a chain hoist located nearby. For such cases a metal protective jacket of galvanized iron can be used over the insulation. It need be only long enough to cover the chafed area.

Pipe insulation may be loosened by excessive line vibration due to bolts or tie rods that have worked loose. The vibration should be eliminated if possible by adjusting the bolts or tie rods, and the insulation reapplied and tightened. Joints should be pointed up with cement, jacketing replaced, and tightly sealed.

South Louisiana Oil Map

The South Louisiana Geological Society has just issued a map, the demand for which will undoubtedly be eager. It shows in outline, all oil fields of South Louisiana, and opposite each pool the following data: Estimated future reserves as of December 31, 1947, cumulative production to December 31, 1947, number of producing wells, and daily average production, as well as the geological age of the producing horizon. Copies are available at $2.50 from P. F. Haberstick, Box 895, Lake Charles, La.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Cracking Yields from Heavy Charge Stocks

A common formula for the yield in cracking is 25 plus 1.5 times the difference of A.P.I. of the feed and the fuel oil. What do you do if the stock is so poor that the yield is under 25 per cent?—F.R.C.

The yield equation for thermal cracking—

$$Y = 25 + 1.5\,(A_S - A_T) \qquad (1)$$

in which Y is the gasoline yield (400 e.p.) in liquid volume per cent and A_S and A_T are the A.P.I. gravities of the feed stock and the fuel oil respectively, was first published in the first edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., N. Y., 1935). It was based on both residual and gas-oil stocks covering the gravity range of about 18 to about 45. The data on residual fuel oils alone give a somewhat steeper yield curve represented by—

$$Y = 19.5 + 1.8\,(A_S - A_T) \qquad (2)$$

This equation is based on charge stocks whose gravities ranged from about 18 to about 28.

Meager data on lower gravity residual charge stocks (16-19 A.P.I.) indicate an even steeper slope equation—

$$Y = 12 + 2.2\,(A_S - A_T) \qquad (3)$$

The maximum errors in these equations are about plus or minus 8 per cent (Equation 1) but nearly all of the data lie within plus or minus 4 per cent and are particularly good at low yields.

A general equation for residual stocks based on Equations 2 and 3 is:

$$Y = \frac{A_S}{1.33} + \frac{40}{A_S}(A_S - A_T) \qquad (4)$$

or

$$= \frac{A_S}{1.33} - 40\,\frac{A_T}{A_S} + 40 \qquad (5)$$

Typical yields by Equation 5 are shown in Table 1.

TABLE 1—TYPICAL GASOLINE AND UNACCOUNTED-FOR YIELDS

A.P.I. 60/60		400 e.p. gasoline Liq. Vol. per cent	Unaccounted-for or gas, per cent
Charge	F. Oil		
18	12	26.8	2.9
18	7	38.9	7.4
13	11	16.0	negative
13	9	22.1	1.1

Although gasoline yields from such equations are reasonable, unaccounted-for or gas yields are erratic. Thus, from Petroleum Refinery Engineering, unaccounted-for yields for gas oil and fuel oil charge stocks of 18 to about 45 A.P.I. are:

$$\text{Gas} = 0.45\,(A_S - A_T)$$

However, for residual stocks the unaccounted-for yields are:

$$\text{Gas} = 0.9\,(A_S - A_T) - 2.5$$

Equilibrium Constants of Mixtures of Carbon Dioxide, Hydrogen, Hydrocarbons, Water, Etc.

In designing our synthetic fuel plants we need data for equilibrium flash calculations (450 psig. and 100°F.) of hydrogen gases and liquids associated with carbon dioxide, carbon monoxide, nitrogen, hydrogen sulfide, and water. Where can we find vapor-liquid K factors for these gases? Any information in this connection will be deeply appreciated.—P.L.W.

Scarcely any information is published although it is understood that many agencies are at work.

The book "Function of Natural Gas in the Production of Oil," by H. C. Miller (A.P.I., New York, 1928) on page 192 shows the solubilities of carbon dioxide, hydrogen, and other gases in crude oils. The data cover the pressure range of 0 to 600 psia. and the temperature is 70°F.

The thermodynamic properties of hydrogen sulfide have been discussed by James R. West in the April 1948 issue of Chemical Engineering Progress, page 287. The behavior of hydrogen sulfide can be estimated with some success from such data.

The relationship between methane, —n-Butane, and water has been studied by McKetta, Jr., and Katz (Methane, —n-Butane-Water System in Two and Three-Phase Regions, Ind. Eng. Chem., 40, 853, May 1948). Likewise, Poettmann and Katz have studied a three-component carbon dioxide system (Carbon Dioxide in Natural Gas - Distillate Condensate System, Ind. Eng. Chem., 38, 531, March 1946). This pertains mainly to the hydrocarbons propane, butane, and pentane. Equilibrium constants for propane-carbon dioxide have been studied by Winkler and Maass, Can. J. Res., 6B, 458 (1932), and benzene and toluene with carbon dioxide by W. Sander, Physik Chem. 78, 513 (1911-12).

The equilibrium constants for hydrogen sulfide in contact with propane have been studied by Brauer and his results are quoted by Gilliland and Scheeline, Ind. Eng. Chem., 32, 48 (1940). Similar data for hydrogen sulfide and hexane, octane, dodecane, and cetane are presented by R. P. Bell, J. Chem. Soc. (London) page 1371 (1,931). Finally, Frolich et al, Ind. Eng. Chem., 23, 548 (1931) discuss systems involving hydrogen sulfide and naphtha or gas oil.

Air and gasoline have been studied by Bridgeman and Aldrich, S.A.E. Jour. 27, 93 (1930), and the relationship between water and kerosine, naphtha, or lube oil is discussed by Griswold and Kasch, Ind. Eng. Chem., 34, 804 (1942).

The systems water - propane and water-butane are completely outlined by Poettmann and Dean, Pet. Refiner, Dec. 1946, and "Dehydrating Commercial Propane" is the title of a paper by K. H. Hachmuth (Butane-Propane News published by the news department of the magazine Western Gas, Jan. 1932).

Although most of the above references do not pertain directly to the question, they are given here because the problem is such a difficult one that any scrap of information must be employed.

In connection with work being conducted at University of Tulsa (masters thesis 1948, Dwight Seeley) approximate distribution coefficients for the three - phase system—brine-pentane-carbon dioxide (K = grams CO_2 per gram benzene divided by grams CO_2 per gram 5 per cent NaCl brine), are:

Pressure, atmospheres	K at 104°F.
0	0
10	14.5
20	17.5
30	19.0
40	35.9
50	41.1
60	68.7

Similar approximate distribution coefficients for the system-brine-cetane-carbon dioxide are:

Pressure, atmospheres	K at 104°F.
0	0
10	7.8
20	11.0
30	12.2
40	13.0
50	13.3
60	13.6
70	14.0
80	25.8

Finally, various methods of correlating or estimating equilibrium relations have been discussed by Stuart T. Hadden in his excellent papers entitled, "Vapor-Liquid Equilibria in Hydrocarbon Systems—Parts I and II" (Chem. Eng. Progress, 44, Jan. and Feb. 1948).

MAINTAINING
MAXIMUM FLOW EFFICIENCY
In Natural Gas Pipe Lines

by D. K. Stephens

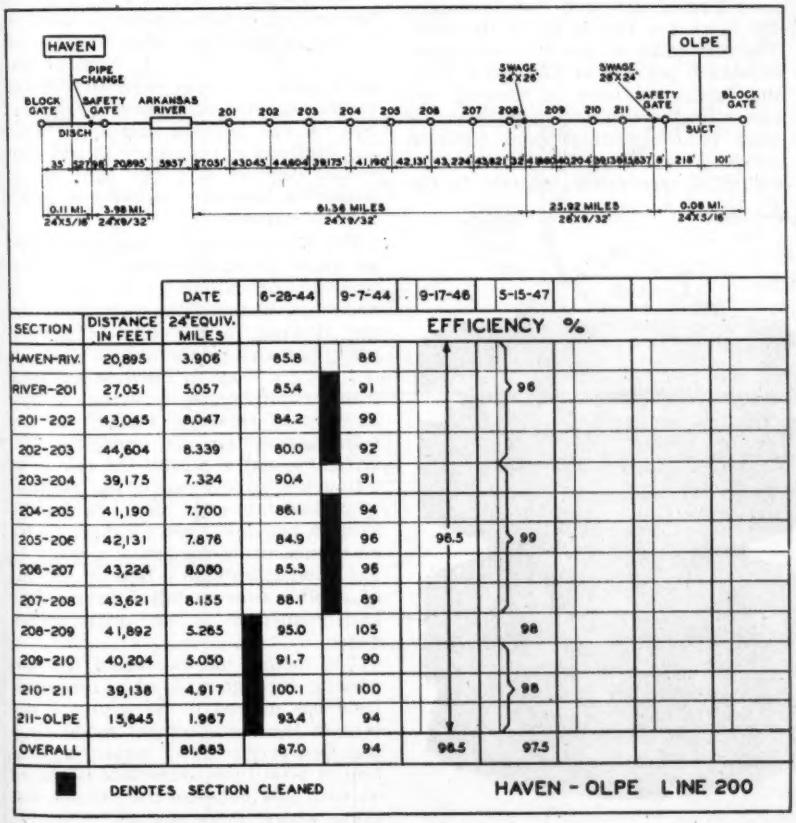
The increasing demand throughout the United States for more and more natural gas has taxed the capacity of most of the pipe-line companies now in the business of transporting natural gas over long distances. Since the steel-pipe supply is far short of the miles needed to increase the capacity of the transmission systems, it is of paramount importance that everything possible should be done to see that the facilities at hand operate at the highest efficiency attainable.

This article deals with the efficiency of the pipe lines, and shows that the interior cleaning of pipe lines, at least insofar as Panhandle Eastern Pipe Line Co.'s lines are concerned, is one way of maintaining the maximum volume of gas flow in an existing pipe-line system. The author, located at Kansas City, Mo., is superintendent of transmission pipe lines for P.E.P.L. Paper presented at spring meeting of Natural Gas Department, American Gas Association.

OUR experience in cleaning lines began about 1939 or shortly after our peak load began to crowd our capacity. Flow tests taken on sections of line between gate valves on our original main line (Line No. 100) between Liberal and Greensburg compressor stations, a distance of approximately 85 miles, showed a decline in efficiency in some of the 8-mile sections to as low as 74 per cent and the over-all efficiency of the 85 miles of line to be only 75 per cent. This was an over-all decline of 17½ per cent from the designed or theoretical efficiency of 92½ per cent. The results of cleaning this line were very excellent, the over-all efficiency having been raised to 93 per cent by the cleaning operation.

In all, we cleaned 265 miles of our main line that year. From 1939 to 1943 we continued cleaning operations whenever the time and conditions permitted and at the same time we were trying to improve the efficiency of the go-devil we were using. By late 1943, we had developed a new type brush cleaner and used it in 1944 to clean both Main Lines 100 and 200 between our Haven and Olpe compressor stations.

The before-and-after cleaning efficiencies on these loops are shown in Fig. 1 which is the form we use for keeping a running record of the efficiencies of each section of line on every loop between compressor stations. A brief description of this form may be of interest.



SECTION	DISTANCE IN FEET	24" EQUIV. MILES	DATE 6-28-44 EFFICIENCY %	9-7-44	9-17-46	5-15-47
HAVEN-RIV.	20,895	3.906	85.8	88		
RIVER-201	27,051	5.057	85.4	91		96
201-202	43,045	8.047	84.2	99		
202-203	44,604	8.339	80.0	92		
203-204	39,175	7.324	90.4	91		
204-205	41,190	7.700	86.1	94		
205-206	42,131	7.876	84.9	96	96.5	99
206-207	43,224	8.080	85.3	96		
207-208	43,621	8.155	88.1	89		
208-209	41,892	5.265	95.0	105		98
209-210	40,204	5.050	91.7	90		
210-211	39,138	4.917	100.1	100		98
211-OLPE	15,645	1.967	93.4	94		
OVERALL		81.683	87.0	94	96.5	97.5

■ DENOTES SECTION CLEANED — HAVEN - OLPE LINE 200

Fig. 1—Chart of efficiencies of a main-line Panhandle Eastern sector, before and after cleaning

General Layout of Line

The name and number of the line is placed in the lower right-hand corner. At the top of the form a schematic drawing shows the general layout of the line, the number of gate valves and river crossings, etc., and the distances between them in feet. Also the diameter and wall thicknesses of the different sizes of pipe in the line and the length in miles of each size are shown.

Below these data in columns are shown the characteristics of each section of line, the first column designating the section, the second column showing the length of each section in feet, and the third column showing the equivalent length of 24 by 5/16-in. pipe in miles. All of the above are fixed figures. The remaining columns are used for recording the date of each flow test, the efficiency of each section, and the over-all efficiency of the line between the two compressor stations on that date. The double line

between these columns, when filled in with red, indicates that that section was cleaned in the interim between flow tests.

It will be noted that the over-all efficiency on June 28, 1944, of Line 200 (Fig. 1) was 87.0 per cent. Shortly after making the flow test on June 28, 1944, seven sections of Line 200 were cleaned. The flow test taken on September 7, 1944, after the cleaning operation shows that the over-all efficiency on Line 200 had been increased to 94 per cent. For the same corresponding dates and operations, the over-all efficiency of nine sections of Line 100 were increased from 82.5 to 93.5 per cent. Confirming this higher efficiency was the fact that with the same discharge pressure at Haven station and with approximately the same volume of gas being pumped through the line, the suction pressure at Olpe station was 20 lb. higher than before the lines were cleaned. That both lines have maintained their high efficiency in the 2 years following is shown by the 1946 and 1947 flow tests (Fig. 1).

It will be seen that the four sections of line (shown in Fig. 1) made up of 26-in. pipe on Line 200 between gate 208 and Olpe station had an exceptionally high flow efficiency when the test was run on June 28, 1944, and that no cleaning was done that year on these sections. This 25 miles of line was constructed late in 1943 and was the first new line to be cleaned with a go-devil before it was put in service.

As mentioned before, the cleaner or go-devil used was the new type developed late the previous year and although at that time it had only three brush rings (see Fig. 2), it was much more efficient than the one we had used previously. Later, the addition of another brush ring was made possible without increasing the over-all length by changing the method of attaching the brushes to the supporting plates (see Fig. 3). Also, in this later design the brushes can be shimmed up after each 1/16-in. wear, thus insuring a tight fit at the start of the run.

We have used this type of go-devil with very good results up to the present time to clean approximately 800 miles of line.

The largest cleaning program we have had in any one year was in 1946 when 566 miles of main line were cleaned of which 241 miles were on Line 100 and 325 miles on Line 200. There were 71 sections of line cleaned each averaging 8 miles in length and a total of 54 work days were used to do the actual cleaning. The average time each section was out of service was 4 hours and 40 minutes and an estimate of total sales lost on account of restricted flow during cleaning operations was 207,000 M.c.f. or a little less than 4,000 M.c.f. per day. The total amount of gas lost from drain, go-devil operation, purge, and blow was 355,000 M.c.f., an average of 5,000 M.c.f. per section cleaned. Of this amount, the gas lost from draining the sections of line preliminary to cleaning was by far the greatest, averaging 3,790 M.c.f. per section or 75.8 per cent of total gas lost. Gas used during go-devil run averaged 325 M.c.f. per run or 6.5 of the total. The remainder of gas lost, averaging 885 M.c.f. per run or 17.7 per cent of the total, was used in blowing the line after the run and in purging the lines before putting them back in service. The net gain in efficiency resulted in recovering capacity to the extent of 12 to 15 million cubic feet per day. The average cost was $170 per mile cleaned exclusive of the cost of the gas lost.

An illustration of the reason why it pays to keep lines up to the designed efficiency or at near thereto as is possible is demonstrated in Fig. 4.

Assume that we install a pipe line 100 miles long which is designed to operate at 92½ per cent efficiency. The efficiency of 92½ per cent is that used by Panhandle Eastern engineers in their design studies.

If the efficiency of the line declines to 85 per cent, the equivalent length in terms of the line having an original efficiency of 92½ per cent has increased to 117 miles representing an increase of 17 per cent. The reduction in capacity amounts to 8.1 per cent of the original capacity.

If the line is not cleaned and its efficiency is allowed to remain at 85 per cent, 19.5 miles of loop line of the same diameter would be required to restore the 100-mile section of line to its original capacity.

The economy of cleaning the line, which would cost approximately $20,000, is readily seen when cost of cleaning is compared with an expenditure of around a half million dollars to lay 19½ miles of large-diameter loop.

Flow Testing

The graph shown in Fig. 5 shows the amount of loop line in percentage of the original line that is required to raise the line to its original capacity for each per cent of decline in the designed efficiency. From this chart it can be seen that a line that has declined in efficiency 15 per cent would require 36½ per cent of its length in loop line to raise it to its original capacity.

For this reason, it is important that we know the efficiencies at which our lines are operating. To do this, it is necessary to know the volume of the gas flowing in the line at certain pressures and temperatures. This is not always easy to measure on long transmission systems owing to the absence of metering stations in the main-line system. To overcome this difficulty and to permit the taking of a flow test on any part of our main or loop line at any time, Panhandle Eastern has developed a simple method of measuring the actual amount of gas flowing through a line by the use of a pitot tube installed in the line and connected to an orifice-meter gage.

The method of measuring the gas passing through a line during these tests has proved to be within 1 per cent of the measurement made by a standard orifice-meter measuring station. A pitot-tube connection is placed on each line between compressor stations where there are no main-line check measuring stations.

(Continued on page 102)

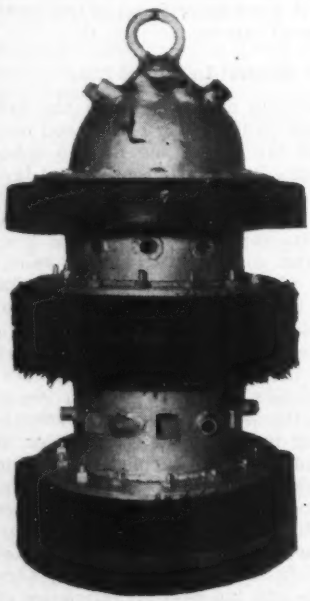
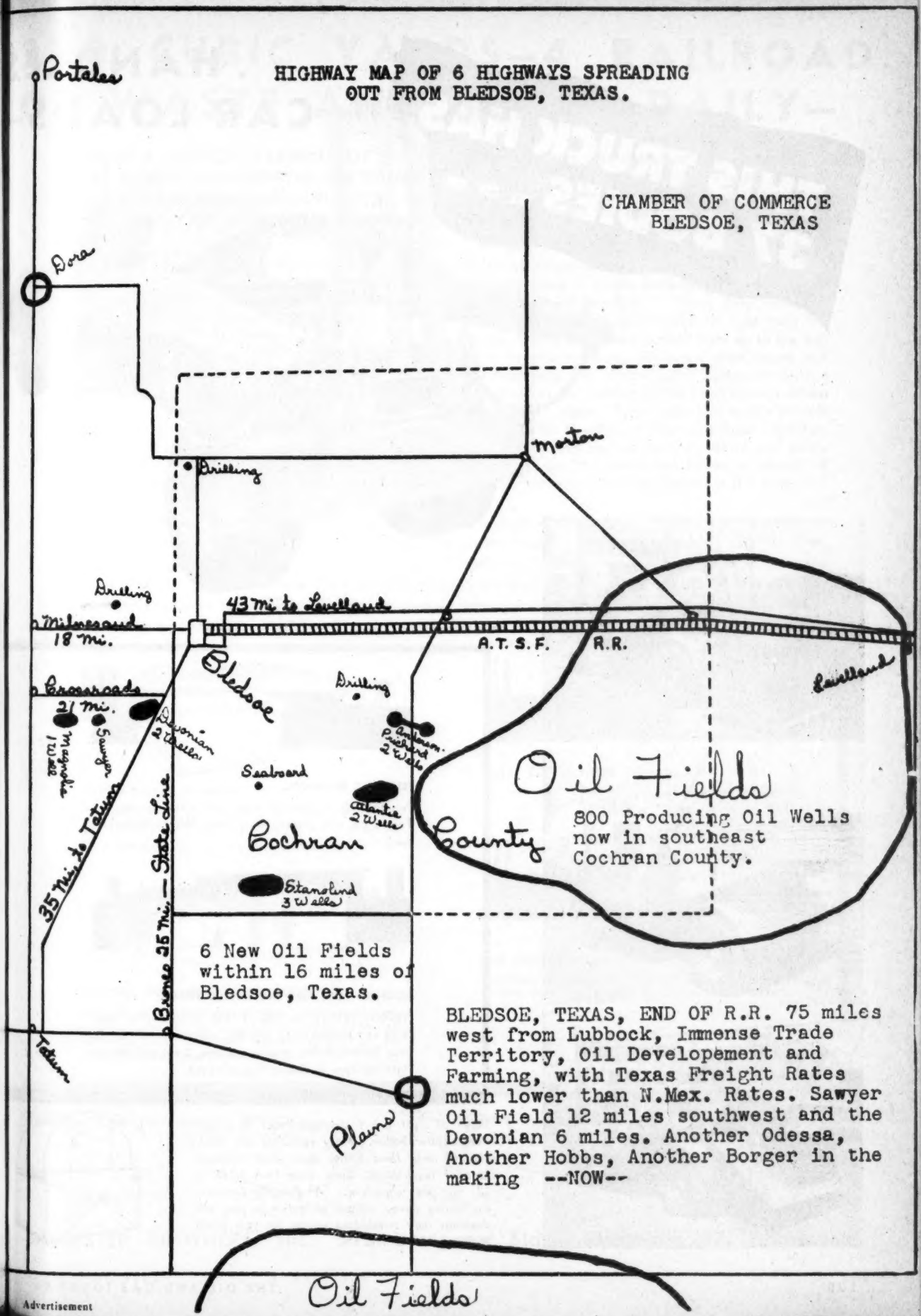


Fig. 2—(Left) Three-brush ring cleaner. Fig. 3—(Right) Four-brush ring cleaner incorporating shimming-up design



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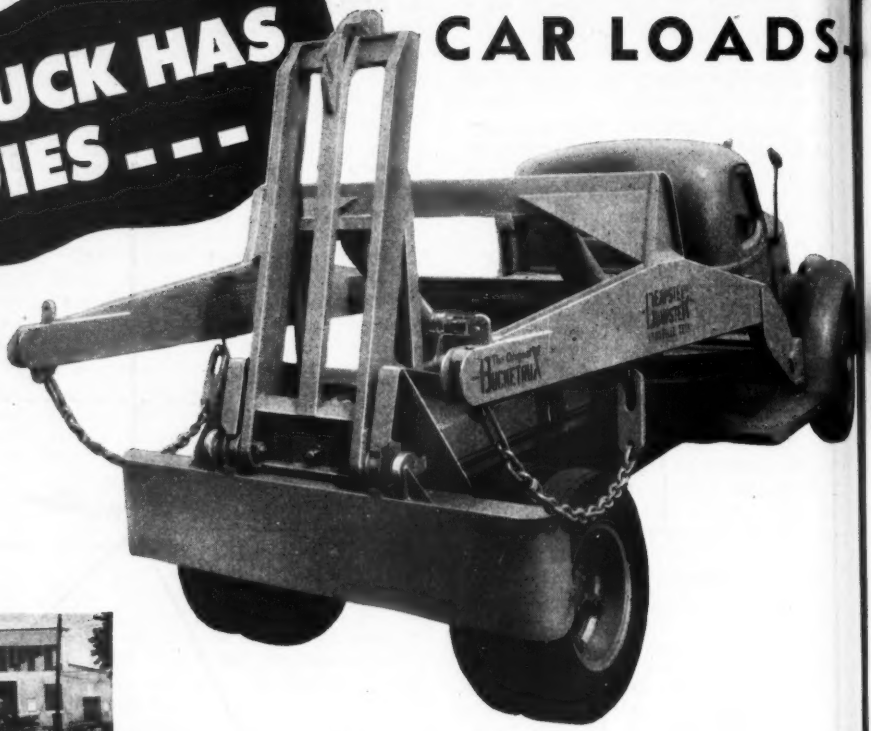
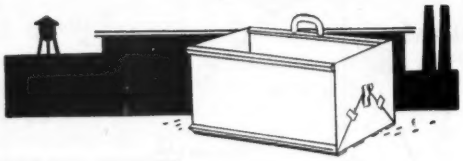
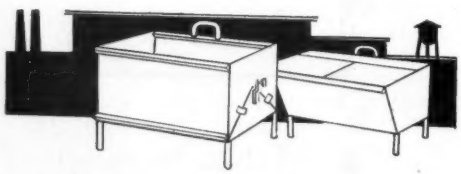




FELT MILL DIVISION

Produces 30 cu. yds. of scrap and clean-up per day. Two, 6 cu. yds. Heavy Duty Drop Bottom Bodies are used.



ROOFING MILL AND MACHINE DIVISION

Produces 104-1/2 cu. yds. of tabs, shingle scrap, slate scrap and roofing scrap per day. Seventeen, 5 cu. yds. Drop Bottom Bodies on legs and two, 2 cu. yds. Water-Tight Tilt Type Bodies on legs are used.

Shown at right are 4 standard types of Dempster-Dumpster bodies. Many variations are available to make these bodies meet every materials handling requirement. Sizes range from 1-1/2 to 20 cu. yds. capacities. A Dempster-Dumpster engineering survey, without obligation to you, will doubtless show tremendous savings for your plant. Write or wire us now.

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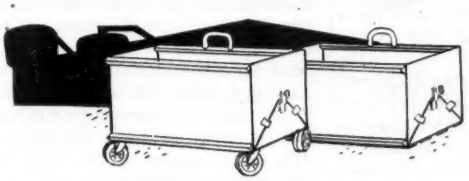
HERE IS A TYPICAL EXAMPLE OF LOW COST DEMPSTER-DUMPSTER MATERIALS HANDLING IN INDUSTRIAL PLANTS. IN THIS CASE, IN A LARGE ROOFING PLANT.

In one of the nation's largest roofing plants, collection and removal of waste and scrap had developed into an expensive problem. Approximately 220 cu. yds. —about 4 railroad car loads—of every type of waste . . . heavy, light, bulky, moist and dry, had to be collected daily from many points in this widespread plant . . . some in driblets, some in large volume. A more flexible, less expensive system of collection was vital.

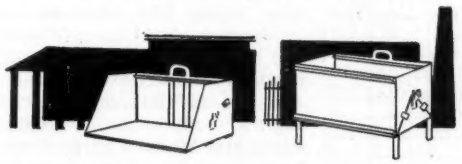
A Dempster Engineering Survey showed how one Dempster-Dumpster Hoisting Unit on truck, serving 37 detachable bodies of various types could collect and dump the plant's entire daily scrap output in only eight hours. As a result of this comprehensive survey, Dempster-Dumpster system was put to work. Spotting the bodies at predetermined accumulation points throughout the plant, the truck hoisting unit and one man, the driver, hydraulically pick up each body as it is filled . . . haul it . . . dump it and return it for reloading (as illustrated at extreme left). The different types of bodies were ordered for most effective materials handled . . . heavy duty bodies for heavy slate scrap . . . light bodies for light bulky felt scrap. Bodies on casters, pushed right up to the machine to receive scrap, eliminated wheelbarrow and hand carrying. At another point bodies are carried in and out of the building by the plant's power driven platform-lift trucks. Scrap collection in this plant is now made on an efficient time-table basis. Savings, over the original cost of handling waste and scrap, have paid for the entire installation in almost 12 months. In many other installations in less time.

Here is how the Dempster-Dumpster System serves all plant sections simultaneously. Replacing an obsolete system of truck-drawn hard wheel trailers, clumsy bins, wheelbarrow handling and hours of useless clean-up time, this installation comprises one truck hoisting unit and 37 bodies in 7 different types. Bodies receive the scrap as it accumulates. When a body is filled, it is picked up by the truck hoisting unit, carried to the disposal area, dumped and returned for refilling. Seven main plant sections are served by the truck hoisting unit, as shown below. Amount of scrap produced and body used is also shown.



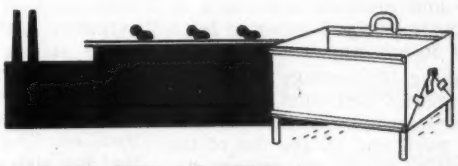
HYDRO-PULPER DIVISION

Produces 28 cu. yds. of scrap per day. One, 6 cu. yds. Heavy Duty Drop Bottom Body and four, 6 cu. yds. Drop Bottom Bodies on casters are used.



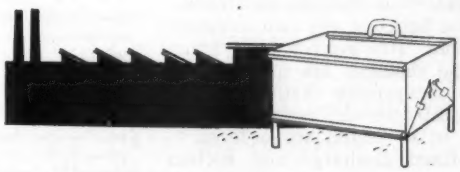
LOADING DOCK AND POWER HOUSE

Produce varying amounts of waste, debris and waste coating in drums. For loading Dock, one 2-1/2 cu. yds. Skip Type Body. For Power House, one, 2-1/2 cu. yds. Drop Bottom Body on legs are used.



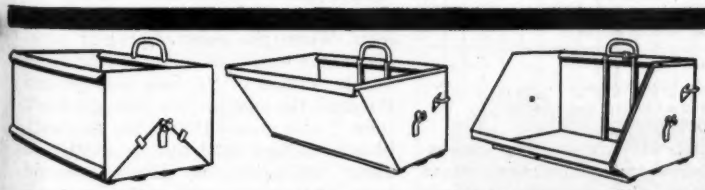
PRESS AND CUTTING DIVISION

Produces 24-1/2 cu. yds. of roofing scrap and cuttings per day. Five, 5 cu. yds. Drop Bottom Bodies on legs are used.



DIE CUTTING PLANT

Produces 30 cu. yds. of scrap per day. Four, 4 cu. yds. special duty Drop Bottom Bodies on legs are used.



DEMPSTER DUMPSTER TRADE MARK REG. SYSTEM

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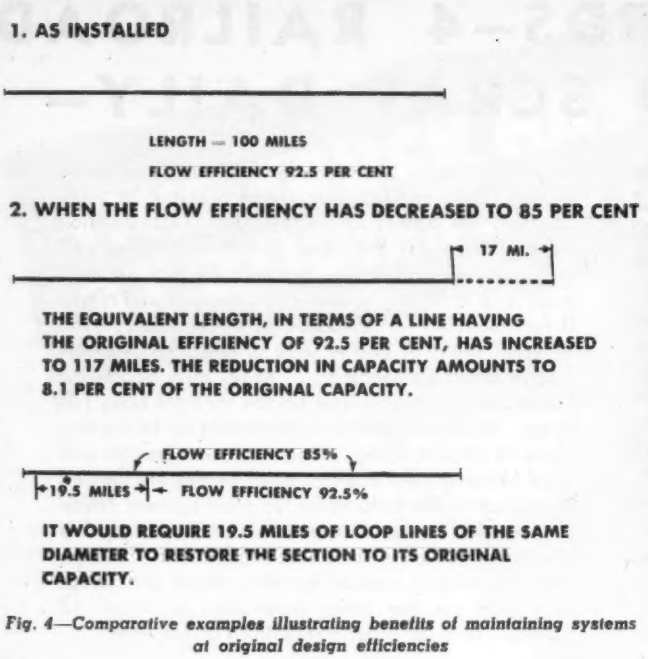
1. AS INSTALLED
LENGTH — 100 MILES
FLOW EFFICIENCY 92.5 PER CENT
2. WHEN THE FLOW EFFICIENCY HAS DECREASED TO 85 PER CENT
17 MI.
THE EQUIVALENT LENGTH, IN TERMS OF A LINE HAVING THE ORIGINAL EFFICIENCY OF 92.5 PER CENT, HAS INCREASED TO 117 MILES. THE REDUCTION IN CAPACITY AMOUNTS TO 8.1 PER CENT OF THE ORIGINAL CAPACITY.
FLOW EFFICIENCY 85%
19.5 MILES
FLOW EFFICIENCY 92.5%
IT WOULD REQUIRE 19.5 MILES OF LOOP LINES OF THE SAME DIAMETER TO RESTORE THE SECTION TO ITS ORIGINAL CAPACITY.

Fig. 4—Comparative examples illustrating benefits of maintaining systems at original design efficiencies

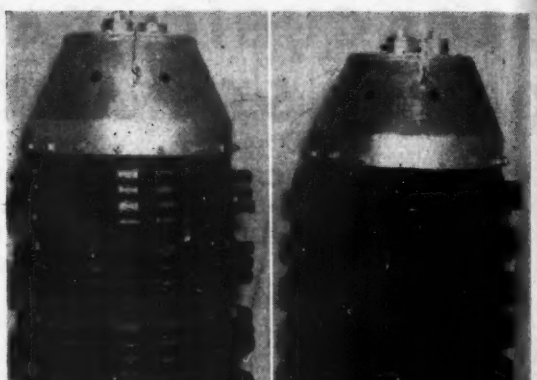

Fig. 6—Photographs of two of the new 26-in. cleaners developed by Panhandle Eastern

When a flow test is to be made, the pitot tube is inserted in the line and the orifice-meter gage is connected and set up at that point. Deadweight gages are used at each end of the line being tested and at all gate valves or other intermediate points where pressures are taken. Readings of gas temperature and pressure are taken simultaneously every 5 minutes for a period of 30 minutes during the test.

The taking of readings simultaneously is greatly facilitated by the use of mobile two-way radio units at each pressure point and by the use of the fixed stations at the compressor stations.

It requires approximately 6 hours to set up the necessary equipment and to complete flow tests on both of our main lines between any two compressor stations. However, 5 or 6 hours before the readings are to be taken, the two compressor stations immediately upstream and downstream on the line to be tested are ordered to hold a fixed discharge and suction pressure respectively (the pressure given them to hold is practically the same as their normal operating pressure). Unless an engine is lost, or other trouble develops, the flow in the line is well stabilized by the time the half-hour readings begin.

Cleaning New Lines

Efficiencies determined from flow tests made on lines in service and previous to a cleaning program can be compared with the efficiency of the same lines immediately after the cleaning operation to see exactly what improvement has been made. In the case of a newly constructed line, however, it is neither convenient nor economical to obtain the flow efficiency of the line before cleaning because to do so would necessitate purging and packing the new line and operating it under normal operating conditions while still fouled with construction dirt, thus resulting in moving a lot of dust and other foreign substances usually found in such lines into sections of clean line or into compressor cylinders and regulating and measuring station equipment. Also, the additional loss of gas in blowing down the line afterwards to run the cleaner would be considerable and hardly justified. The fact of the matter is that the high efficiency of newly constructed lines, which have been cleaned by running a go-devil through

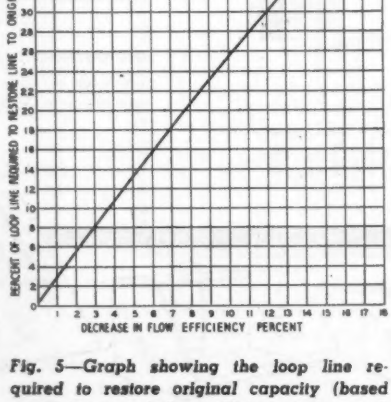

Fig. 5—Graph showing the loop line required to restore original capacity (based on 92.5 original flow efficiency), for each per cent decrease in flow efficiency from the original efficiency

them before placing them in service, is sufficient reason for establishing our policy of so cleaning all new lines 12 in. or larger immediately upon their completion.

The cost of running a go-devil through a new line at the finish of construction is very little more than the cost of simply blowing the line to clean it. For instance, in 1946 we laid approximately 24 miles of 26-in. on Loop Line 300 out of Tuscola, Ill., compressor station. The loop consisted of three sections of solid welded line with a gate valve every 8 miles. When the construction started out of Tuscola station, the pipe-line crew inserted a 26-in. go-devil of the type shown in Fig. 3 just downstream from the fire gate at the station, welded the line, and forgot about it for the time being. The pipe-line contractor proceeded with his work of laying the line up to within a couple of hundred feet of the next gate valve where the end of that section was raised high enough to clear the top of the ditch and blocked in position. A waterproof night cap was placed over the end of the pipe. As soon as the next gate valve was set, another 26-in. go-devil was inserted in the line just downstream from it and the line was welded together as before. The same operations were repeated during the construction of last section of this loop. When the contractor had completed the entire 24 miles of line, each 8-mile section of the line was purged through the opening in the go-devil, then it was cleaned with the go-devil, blown, packed, and put in service in about the same way the job would have been done and with approximately the same amount of gas lost in the cleaning as would have been

the case if go-devils had not been used.

Go-Devil Design vs. Roughness of Pipe

There are a number of different types of interior pipe cleaners in use today. One type may be more efficient than another under certain conditions depending on the degree of roughness of the pipe walls and the thickness and composition of the layer of removable substances which are causing the roughness.

The degree of roughness of interior pipe walls causing loss in efficiency and the reason for such loss has been discussed at past conventions, two papers on this subject being:

"Flow of Natural Gas in Rough Lines," by Ray Ransom, and "Use of the Go-Devil for Improving the Flow Efficiency on Natural-Gas Pipe Lines," by C. H. M. Burnham.

These papers were presented at the 1940 A.G.A. convention at Houston.

From an inspection made of joints removed from sections showing low flow efficiency, we have found that an incrustation on the pipe walls, having a sandpaper-like texture, may be .0001 in. or less in thickness and yet cause a marked decline in the flow efficiency of the pipe line. A film of this kind is composed of the sand, dirt, oil, and the products of corrosion accumulated while the line is in service. Another type of film, which may exist in much heavier layers, is rust which is formed during the time pipe has been in storage before being used. The go-devil shown in Fig. 3, which uses steel brushes of varying degree of coarseness, has given us the best results so far in removing both of these films. However, there is still room for improvement in the cleaners in use at the present time.

A cleaner or go-devil combining all of the best principles of the cleaners in general use for natural-gas lines would be one that had the following characteristics:

1. It would provide the maximum possible ratio of the total area of brush surface to the total weight of the machine.
2. It would be flexible enough to travel around factory bends.
3. It would maintain a constant and equal brush pressure against the top, sides, and bottom of the pipe at all times.
4. If necessary, two or more sections could be joined together to make one long unit thus making it unnecessary to run it more than once.
5. It would conform to the shape of buckled or egged pipe and would pass through such deformed pipe without hanging up or being damaged.
6. It could be stopped in a cage at the end of the run.
7. It would give the maximum wear of the brushes before making it necessary to shim up or replace them.

Panhandle Eastern has been working on the development and has applied for a patent on a new type of cleaning apparatus which we hope will meet the above specifications. Fig. 6 shows a photograph of two 26-in. cleaners of the new type. The one on the left has brush bristles made from round steel wire and those on the right are made from wire with a flat cross-section.

The body is reinforced rubber similar to a heavy-duty truck tire and is designed to expand 1½ in. with 25-lb. internal pressure. Tests made with it last summer proved it to be capable of going around bends having a radius of only 1½ times the pipe diameter without any stoppage or damage.

The head and tail pieces are fabricated from steel plate of from ⅛ to ¼ in. thickness. A number of ports in the head, which remain open at all times, permit a certain amount of gas to flow through the machine during its progress to keep dirt and scale removed by the brushes from accumulating ahead of the machine. Also smaller ports in the neck of the tail piece permit enough gas to pass through the brush fibers to keep them clean.

A number of orifices are provided in an inside plate at the rear of the rubber core and just ahead of the relief valves. This number of orifices can be varied to maintain the required pressure inside the core and

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If these uses suggest a possible application for chromates in your operations, our Research Department will be glad to collaborate with you.

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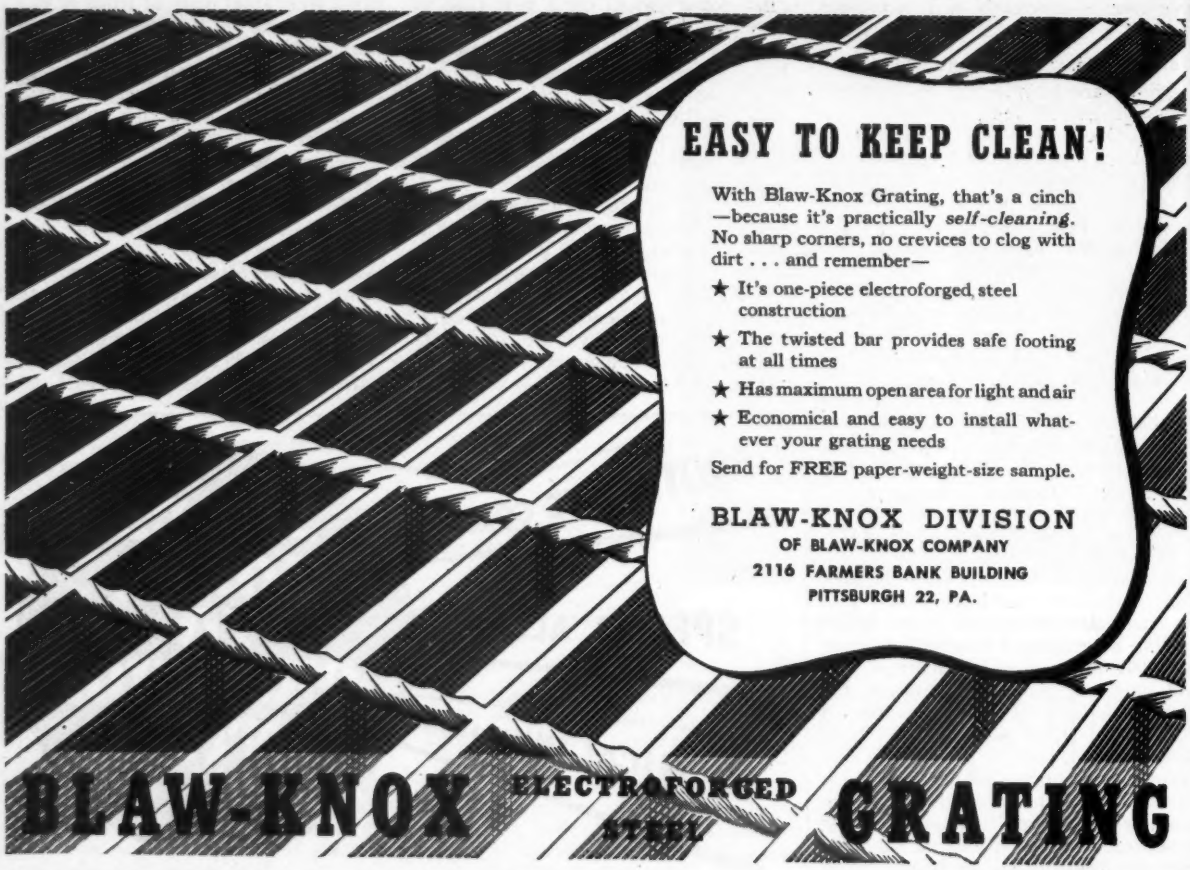

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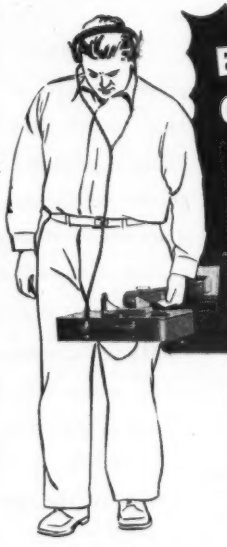

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thereby against the brushes. The valves in the head of the machine are relief valves which help maintain the inside pressure. The valves shown on the neck of the tail piece are for the purpose of equalizing the pressure inside and outside of the core in case the go-devil gets hung up. These latter valves are set to open at 10 to 15 lb. higher than the maximum pressure normally required to propel the go-devil, hence will not open and equalize the pressure unless the go-devil gets stuck and the pressure builds up abnormally.

By removing the head piece of one and the tail piece of the other and fastening the two together with belting, an extra-long cleaner can be made.

We ran one of these, of the type shown on the right of Fig. 6, through 5 miles of new 26-in. line at Hugoton, Kans., last year for the first time. Outside of losing some of the brushes, it did an excellent job of cleaning. The speed was controlled to around 15 m.p.h. and the apparatus was successfully caught at the end of the run in a slotted joint of pipe. New-type brush holders were devised after that trial which we believe will eliminate any further trouble from loss of brushes.

We have several of these new go-devils assembled and hope to try them out this summer.

As go-devil design improves, results of cleaning will improve. This company is 100 per cent sold on the economic and operating results of pipe-line cleaning during construction and subsequently as flow tests indicate the need.

Diamond Bits

(Continued from page 86)

yond which it would become a contributory factor in causing early breakdown. As it is, these large bits have performed equally as well as the smaller sizes; but care must be taken to adjust the rotary speed, weight, and fluid volume so that equal efficiency of operating conditions is obtained.

Personnel Training Important

A simple way in which all companies using diamond bits can help in maintaining steady progress is to build up a nucleus of personnel trained in the necessary operating technique. One or more of the engineers in each locality should be thoroughly conversant with all operational details, and also with the construction and maintenance of the core barrels. Drilling crews attain proficiency in diamond drilling very rapidly, but they do not always stay in the same location for any long period of time.

In the same way, companies move their engineers from one place to another; therefore it has often happened that diamond drilling has been undertaken in a locality where it had previously been successful, but on the next attempt the results were somewhat disappointing. This has invariably been due to a change in operating personnel or supervision. The companies supplying bits and core barrels usually have a representative on hand when diamond drilling is first started, in order to make sure that the operation gets away to a good start; but after the method has proved successful the operator takes over the remainder of the drilling. In cases where oil companies have given certain of their personnel facilities to become expert in diamond drilling, and have given them opportunities to study the variations of technique necessary in different formations, the results have been very apparent in successful operations and reduced costs.

Egyptian Storage Planned

Societe Chatillion-Commentry plans to build an oil storage terminal at the Egyptian port of Alexandria, according to the Egyptian Council of Ministers which has approved the request from this French company. The cost will approximate £500,000, or $2,000,000.

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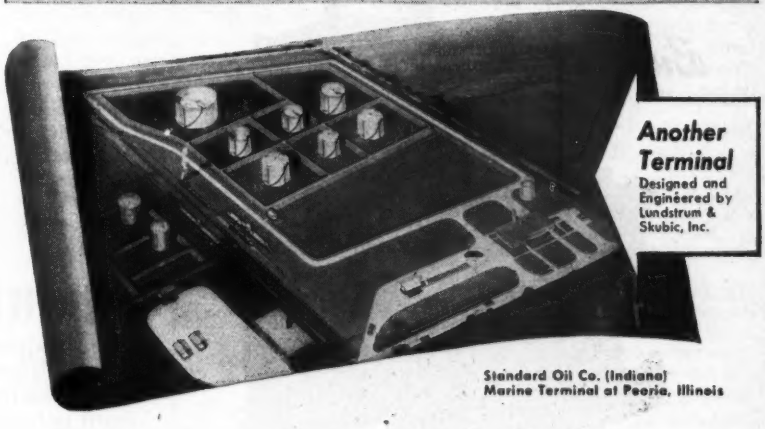

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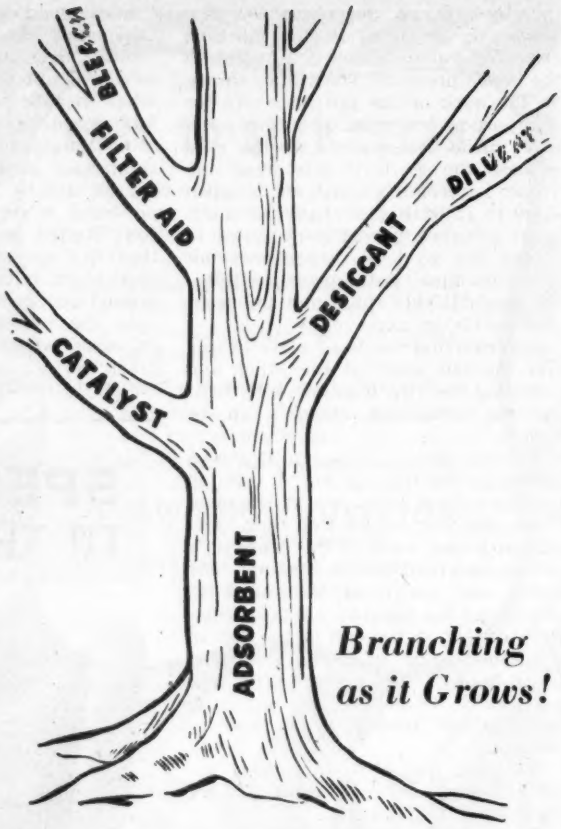

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ENGINEERING fundamentals

Estimation of Reservoir Saturation

THE number of barrels of stock-tank oil which remain in a reservoir at any time is readily calculated by subtracting that which has been produced from the amount which was originally present within the reservoir. The quantity so found, however, does not suffice to define the fluids in the reservoir for flow or displacement calculations, because both flow and displacement are measured in terms of the oil saturation and not in terms of stock-tank barrels. A knowledge of the amount of reservoir pore space that is filled with reservoir liquid at any time is the desired quantity, and it will differ from the barrels of stock-tank oil that remain.

The present discussion will concern itself with outlining a means used to estimate reservoir oil saturation at any time during the life of the reservoir. In order to make this estimation, it is required that numerous simplifying assumptions be made. The results, although limited by such assumptions, are useful at least in a qualitative and sometimes quantitative sense.

The assumptions made are primarily those which limit analysis to an internal gas-driven reservoir. These are (1) that the amount of reservoir pore volume remains constant during the production history, and (2) that the oil which remains within the reservoir (and the gas also) be distributed evenly throughout the pore space. It will be assumed at first also that no water is produced from the reservoir, although the calculation can be made without this assumption.

The pore volume of the oil zone of a reservoir may of course be calculated directly from a knowledge of the areal extent, thickness of pay, and the porosity of the formation. It can also be calculated indirectly from a knowledge of the reservoir oil volume in place and the per cent oil saturation. By definition, oil saturation equals the reservoir oil volume divided by pore volume, so if the first two quantities are known, the latter can be found. This will be the procedure used below.

Let the initial oil saturation be designated as S_{oi} and the initial water saturation be designated by S_w and let it be assumed that no free gas is present originally (only the oil zone is being discussed). Then the sum of the oil and water saturations must be unity, or:

$$S_{oi} = 1 - S_w \qquad (1)$$

By definition, however, the oil saturation is:

$$S_{oi} = \frac{\text{Reservoir oil volume}}{\text{Pore volume}} \qquad (2)$$

The reservoir oil volume is equal to $N\beta_o$ if there are N barrels of stock-tank oil in place originally, with a formation volume of β_o. Therefore, the pore volume of the oil zone is:

$$\text{Pore volume} = \frac{N\beta_o}{1 - S_w} \qquad (3)$$

According to the first assumption made, this will always be the pore volume of the oil zone. Therefore, at a subsequent time, the new oil saturation can be found by dividing the new reservoir oil volume by this pore volume.

When ΔN barrels of stock-tank oil have been produced and the pressure has fallen to a value P, the stock-tank oil remaining is $(N - \Delta N)$ barrels, and the reservoir volume it occupies will be $(N - \Delta N)\,\beta$, where β is the formation volume factor at P. The oil saturation S_o, in the reservoir is, from the above quantities, found to be:

$$S_o = \frac{(N - \Delta N)\,\beta}{\text{Pore volume}} = \frac{(N - \Delta N)\,\beta}{N\beta_o/(1 - S_w)} \qquad (4)$$

By rearrangement this becomes:

$$S_o = \left(1 - \frac{\Delta N}{N}\right)\frac{\beta}{\beta_o}(1 - S_w) \qquad (5)$$

In the event that the reservoir is not one of constant volume, Equation 4 would have the pore volume modified by the amount of water encroachment, and the resulting expression for oil saturation would not be so simple. For many calculations, Equation 5 is useful and yields results which are in agreement with observed conditions. Its primary use has been for the evaluation of saturation conditions at which a given relative permeability applies.

Since, for a given reservoir, N, S_w, and β_o are fixed constants, Equation 5 can be considered to give oil saturation as a function of produced oil and pressure, the latter being the quantity which determines β. For a given reservoir the calculation can be made and plotted to show the separate variations.

Fig. 1 is a graph of Equation 5 which can be used for any calculation of S_o at the water saturations indicated. Equation 5 is, of course, linear between S_o and $\Delta N/N$ for fixed values of β/β_o and S_w. Such a graph could be made for any chosen value of S_w.

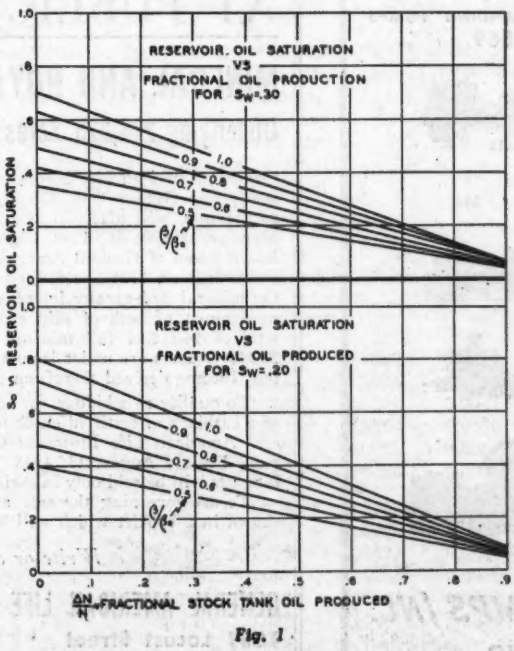

Fig. 1

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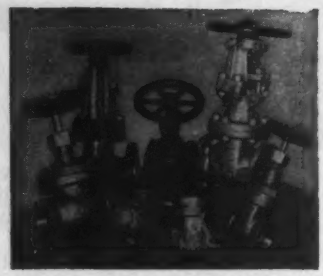

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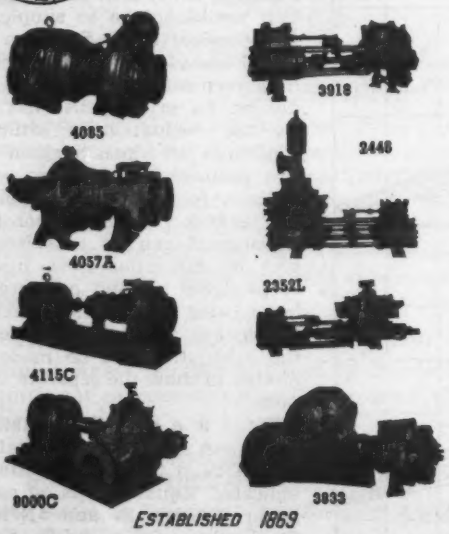

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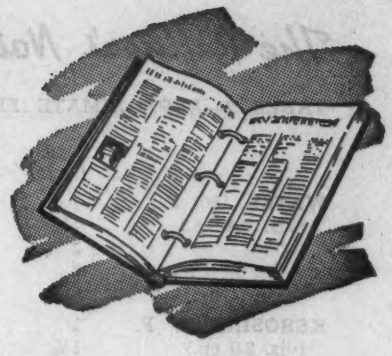
The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Friction Factors

FOR practical purposes the loss in pressure that occurs as noncompressible fluids flow through a circular conduit can be expressed as:

$$\Delta P = \frac{0.323\ su^2L}{D} f \text{ or } \frac{1.488\ Q^2sL}{100{,}000\ D^5} f$$

ΔP = pressure loss, psi.
s = sp. gr. referred to water at 60° F.
u = velocity, ft. per sec.
L = equivalent length of straight pipe, ft.
D = inside diameter of pipe, in.
Q = discharge rate, gal. per hour.

Although the use of the Q form (gal. per hour) avoids a computation of the velocity (u), it is not particularly convenient because it involves the fifth power of the diameter (D^5). Table 1 indicates the values of the fifth powers of common pipe sizes.

TABLE 1—INSIDE DIAMETER OF PIPE TO THE FIFTH POWER

Nominal pipe size	Sched. 40	Sched. 80	Sched. 160
1	1.27	0.802	0.36
1¼	5.0	3.41	2.10
1½	10.8	7.6	4.29
2	37.5	27.2	13.7
3	342.0	205.0	125.0
4	1,060.0	820.0	475.0
6	8,100.0	6,350.0	3,730.0

The equivalent length (L) is the length of straight pipe plus the equivalent length of fittings, constrictions, etc. *(see Refiner's Notebook No. 176, December 27, 1947, page 285).*

The only really troublesome factor is the friction factor (f). This is related to the viscosity, specific gravity, velocity, and pipe diameter (Reynolds number) and for precise calculations it is advised that the friction factor be computed (see Petroleum Refinery Engineering, 2nd Ed., page 167 or Chemical Engineers Handbook, 2nd Ed., page 811, both of McGraw-Hill Book Co., New York). However, for the conditions commonly encountered in petroleum refinery transfer lines, the friction factors shown in Table 2 are conservative and usually adequate for judging the pressure drops through most of the short lines in refineries. Commonly used velocities are shown in bold-face type.

The condition of the surface of the pipe also has some effect. Table 3 indicates factors by which the pressure drop should be multiplied when special pipe is encountered.

TABLE 3—EFFECT OF SURFACE CONDITION

	Multiplier for condition of surface
Brass, copper, or lead (smooth)	0.9
Steel, cast iron, or corrosion-resistant metal (new)	1.0
Wood pipe or concrete lined (smooth)	1.2
Riveted steel or old cast iron	1.4
Vitrified or old steel pipe	1.6
Old riveted steel pipe	2.0
Badly tuberculated pipe	2.5

Example.—Seven hundred gallons per hour of a 42° A.P.I. kerosine are being pumped through a 2-in. Schedule 40 line at a temperature of 100° F. The length of the line plus the equivalent length of fittings, etc., is 340 ft.

The velocity of flow is:

$$\frac{700}{7.48} \times \frac{1}{3{,}600} \times \frac{144 \times 4}{(2.07)^2 \times 3.1416} = 1.11 \text{ ft./sec.}$$

According to Table 2, the friction factor will be about 0.0098 (about 0.0105 at 60° F. and 0.0084 at 150° F.) and the pressure drop will be about:

$$\Delta P = \frac{0.323 \times 0.8155 \times (1.11)^2 \times 340}{2.07} \times 0.0098 = 5.23 \text{ psi.}$$

TABLE 2—APPROXIMATE FRICTION FACTORS FOR STEEL OR CAST IRON PIPE

	Pipe (in.)	Velocity, ft. per sec. ½	1	2	3	4	5	6	8
GASOLINE, 60° F. (vis. 0.7 cp.)	1	0.0115	**0.0098**	**0.0082**	**0.0074**	**0.007**	0.0066	0.0064	0.006
	1½	0.0105	**0.0088**	**0.0074**	**0.0068**	**0.0064**	**0.0061**	0.0059	0.0056
	2	0.010	**0.0083**	**0.0070**	**0.0065**	**0.0061**	**0.0058**	0.0056	0.0054
	3	0.0089	0.0074	**0.0064**	**0.0059**	**0.0056**	**0.0054**	**0.0053**	0.0051
	4	0.0083	0.0070	0.0061	**0.0056**	**0.0054**	**0.0052**	**0.0051**	0.0049
	6	0.0075	0.0064	0.0056	0.0053	**0.0050**	**0.0049**	**0.0048**	**0.0047**
WATER, 60° F. (vis. 1.0 cp.)	1	0.012	**0.010**	**0.0083**	**0.0075**	0.0070	0.0067	0.0065	0.0061
	1½	0.0107	**0.0090**	**0.0075**	**0.0069**	0.0065	0.0062	0.0060	0.0056
	2	0.010	0.0084	**0.0071**	**0.0065**	**0.0062**	0.0059	0.0057	0.0055
	3	0.0090	0.0076	**0.0065**	**0.0060**	**0.0057**	0.0055	0.0054	0.0051
	4	0.0084	0.0071	0.0062	**0.0057**	**0.0055**	**0.0053**	0.0051	0.0049
	6	0.0076	0.0065	0.0057	**0.0054**	**0.0051**	**0.0050**	**0.0049**	0.0047

(Continued on Next Page)

No. 206 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

TABLE 2—APPROXIMATE FRICTION FACTORS FOR STEEL OR CAST IRON PIPE (Continued)

	Pipe (in.)	Velocity, ft. per sec. ½	1	2	3	4	5	6	8
WATER, 150° F.	1	0.0094	0.0080	0.0068	0.0062	0.0058	0.0056	0.0055	0.0052
(vis. 0.4 cp.)	1½	0.0085	0.0072	0.0062	0.0058	0.0055	0.0053	0.0052	0.0049
	2	0.0080	0.0068	0.0060	0.0056	0.0053	0.0051	0.0050	0.0048
	3	0.0072	0.0063	0.0055	0.0052	0.0050	0.0049	0.0048	0.0046
	4	0.0068	0.0060	0.0053	0.0050	0.0048	0.0047	0.0046	0.0045
KEROSINE, 60° F.	1	0.0150	0.0125	0.0104	0.0094	0.0088	0.0083	0.0080	0.0074
(vis. 2.0 cp.)	1¼	0.0140	0.0118	0.0098	0.0089	0.0082	0.0078	0.0074	0.0070
	1½	0.0134	0.0112	0.0095	0.0085	0.0079	0.0075	0.0072	0.0068
	2	0.0127	0.0107	0.0089	0.0080	0.0075	0.0071	0.0068	0.0064
	3	0.0113	0.0096	0.0080	0.0072	0.0068	0.0065	0.0062	0.0059
KEROSINE, 150° F.	1	0.0125	0.0101	0.0085	0.0077	0.0072	0.0068	0.0066	0.0060
(vis. 0.85 cp.)	1¼	0.0118	0.0095	0.0080	0.0072	0.0068	0.0065	0.0063	0.0057
	1½	0.0112	0.0092	0.0077	0.0070	0.0066	0.0063	0.0061	0.0056
	2	0.0107	0.0086	0.0073	0.0066	0.0063	0.0060	0.0058	0.0054
	3	0.0096	0.0078	0.0066	0.0061	0.0058	0.0056	0.0054	0.0050
KEROSINE, 300° F.	1	0.0100	0.0083	0.0070	0.0064	0.0061	0.0058	0.0056	0.0054
(vis. 0.35 cp.)	1¼	0.0093	0.0078	0.0066	0.0061	0.0058	0.0056	0.0054	0.0052
	1½	0.0090	0.0075	0.0065	0.0059	0.0056	0.0055	0.0053	0.0051
	2	0.0084	0.0071	0.0062	0.0057	0.0054	0.0053	0.0051	0.0049
	3	0.0076	0.0065	0.0057	0.0053	0.0051	0.0049	0.0048	0.0047
GAS OIL, 60° F.	1	0.0590	0.0275	0.0160	0.0147	0.0135	0.0128	0.0121	0.0113
(vis. 12.0 cp.)	1½	0.0410	0.0183	0.0146	0.0130	0.0122	0.0115	0.0110	0.0102
	2	0.0310	0.0163	0.0137	0.0123	0.0115	0.0109	0.0103	0.0096
	3	0.0200	0.0148	0.0123	0.0110	0.0103	0.0097	0.0093	0.0086
	4	0.0167	0.0137	0.0116	0.0103	0.0096	0.0091	0.0087	0.0081
GAS OIL, 150° F.	1	0.0183	0.0148	0.0123	0.0110	0.0103	0.0097	0.0093	0.0086
(vis. 4.0 cp.)	1½	0.0157	0.0132	0.0111	0.0100	0.0093	0.0088	0.0084	0.0078
	2	0.0148	0.0126	0.0105	0.0094	0.0088	0.0083	0.0079	0.0074
	3	0.0132	0.0112	0.0094	0.0084	0.0079	0.0074	0.0071	0.0067
	4	0.0123	0.0105	0.0088	0.0079	0.0074	0.0070	0.0068	0.0064
GAS OIL, 300° F.	1	0.0130	0.0110	0.0092	0.0083	0.0077	0.0073	0.0070	0.0066
(vis. 1.2 cp.)	1½	0.0119	0.0100	0.0083	0.0075	0.0070	0.0067	0.0065	0.0061
	2	0.0111	0.0094	0.0078	0.0071	0.0066	0.0064	0.0062	0.0058
	3	0.0100	0.0084	0.0071	0.0065	0.0061	0.0059	0.0057	0.0054
	4	0.0093	0.0078	0.0067	0.0062	0.0058	0.0056	0.0054	0.0052
LIGHT LUBE, 60° F.	1	0.133	0.067	0.034	0.023	0.017	0.016	0.0152	0.0142
(vis. 30.0 cp.)	1¼	0.103	0.052	0.026	0.0173	0.0160	0.0150	0.0143	0.0132
	1½	0.090	0.045	0.023	0.0165	0.0152	0.0145	0.0139	0.0130
	2	0.071	0.035	0.018	0.0157	0.0145	0.0137	0.0130	0.0120
	3	0.046	0.023	0.0157	0.0140	0.0130	0.0122	0.0118	0.0109
LIGHT LUBE, 150° F.	1	0.042	0.021	0.015	0.0136	0.0127	0.0120	0.0114	0.0106
(vis. 9.0 cp.)	1¼	0.032	0.017	0.014	0.0128	0.0119	0.0111	0.0107	0.0099
	1½	0.028	0.0161	0.0137	0.0122	0.0113	0.0108	0.0103	0.0096
	2	0.022	0.0152	0.0129	0.0116	0.0108	0.0101	0.0097	0.0090
	3	0.0163	0.0138	0.0115	0.0103	0.0096	0.0091	0.0087	0.0081
LIGHT LUBE, 300° F.	1	0.0148	0.0123	0.0102	0.0093	0.0086	0.0082	0.0078	0.0073
(vis. 1.9 cp.)	1¼	0.0139	0.0115	0.0096	0.0087	0.0081	0.0076	0.0073	0.0069
	1½	0.0132	0.0110	0.0093	0.0084	0.0078	0.0074	0.0071	0.0067
	2	0.0126	0.0103	0.0088	0.0079	0.0074	0.0070	0.0068	0.0064
	3	0.0112	0.0094	0.0079	0.0071	0.0067	0.0064	0.0062	0.0058
MEDIUM LUBE,	1½	.....	.....	.....	0.710	0.540	0.435	0.360	0.270
60° F.	2	.....	1.500	0.850	0.560	0.430	0.345	0.285	0.215
(vis. 1,000 cp.)	3	.....	1.080	0.560	0.375	0.280	0.225	0.188	0.140
	4	1.600	0.850	0.420	0.285	0.215	0.175	0.145	0.109
MEDIUM LUBE,	1½	0.106	0.053	0.027	0.018	0.016	0.015	0.0143	0.0133
150° F.	2	0.083	0.042	0.021	0.0161	0.0150	0.0141	0.0136	0.0127
(vis. 23.4 cp.)	3	0.054	0.028	0.016	0.0146	0.0136	0.0128	0.0121	0.0113
	4	0.042	0.021	0.015	0.0136	0.0126	0.0120	0.0114	0.0107
MEDIUM LUBE,	1½	0.0169	0.0140	0.0118	0.0107	0.0099	0.0094	0.0089	0.0083
300° F.	2	0.0160	0.0132	0.0111	0.0100	0.0093	0.0088	0.0084	0.0078
(vis. 3.3 cp.)	3	0.0141	0.0119	0.0100	0.0090	0.0084	0.0079	0.0076	0.0070
	4	0.0132	0.0111	0.0093	0.0084	0.0078	0.0074	0.0071	0.0067

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SOME COMPANIES look upon advertising as an expense. When expenses have to be cut, the advertising budget looks like a good place to begin.

The only trouble with that theory is — it won't work.

Advertising can become expensive when you don't use *enough* of it. And "NO advertising" can cost far more than the "saving" it appears to create.

It's like failing to lubricate a piece of valuable machinery. You save the cost of the lubricant — but eventually there's a big repair bill to pay, not to mention your production losses while the machine is idle.

Advertising works something like a machine. It is the application of assembly-line methods to the five basic steps in the manufacture of a sale —

1. Seeking out prospects
2. Arousing their interest
3. Creating a preference for your product
4. Making a specific proposal
5. Closing the order

Can advertising perform all five of these steps? No, it usually takes a good salesman to handle the last two. But advertising *can* save much of his valuable time.

By mechanizing the *missionary job*, advertising becomes the most efficient method of manufacturing sales at a profit. Especially when it appears in the business press, where it is concentrated among your company's best prospects — *and no one else!*

THE OIL AND GAS JOURNAL

is a member of The Associated Business Papers, who have published an interesting folder entitled, 10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

SCOT
RING
GASKETS
Standard and special ring gaskets, precision-machined from stainless and steel forgings of minimum hardness. Gauged to pitch diameter. Available in oval and octagonal. For perfect service insist on SCOT ring gaskets.
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REFINING

New Phillips Chemical Co. Leases Etter, Tex. Plant

Phillips Chemical Co. a newly formed wholly owned subsidiary of Phillips Petroleum Co., has been organized for the purpose of conducting the company's chemical and synthetic rubber operations as well as its furnace type carbon-black operations now handled by another wholly owned subsidiary, Philtex Chemical Co.

To carry out the company's new program Phillips Chemical has leased on a long term basis the Department of the Army's Cactus Ordnance Works at Etter, in the Texas Panhandle. This plant was originally designed to produce anhydrous ammonia for the manufacture of explosives during the war and later was reactivated for use in the fertilizer program. It is one of the largest ammonia plants in the world and will be used by the company to produce ammonia for nitrogenous fertilizers. Plant capacity is expected to be doubled from approximately 70,000 tons to more than 140,000 tons. Cost of the program is estimated at $16,000,000. Also included in Phillips' plans of development is construction of a new ammonium nitrate plant at Etter.

Under the lease agreement the Army will have the option to purchase either all or part of the production from this plant for its requirements until June 30, 1952. Production over and above these requirements will be disposed of by Phillips for use in the civilian economy.

The plant, using natural gas as the raw material, is located in one of the largest gas fields in the world. Phillips has guaranteed a gas reserve amounting to over 20,000,000,000 cu. ft., which will be sufficient to provide for operation of the expanded plant for a period of approximately 20 years.

It is expected that Phillips will take possession of the premises for operation of the plant under contract within the next month. G. W. McCullough has been named vice president and general manager of the new company.

The company now "is in the process of closing the purchase" from War Assets Administration for presently idle shipyard properties on the Houston ship channel where the Phillips chemical subsidiary will operate a major plant "as the nucleus of the company's operations on the Gulf Coast," according to K. S. Adams, president of Phillips Petroleum Co.

Fen-Ter Refining Becomes Division of Kerr-McGee

Fen-Ter Refining Co., a wholly owned subsidiary of Kerr-McGee Oil Industries, Inc., has merged into the parent company to operate as the refining division. The same personnel and management of the company will be maintained at the Oklahoma City and Wynnewood, Okla., offices.

The company's refinery at Wynnewood has a crude oil capacity of 6,000 bbl. daily and a cracking capacity of 1,500 bbl. daily.

Pure Oil Begins Work On New Research Center

Construction has begun on Pure Oil Co.'s major petroleum research center at Crystal Lake, Ill., to provide research and development facilities for Pure Oil scientists and technicians, according to a recent announcement by J. Porter Langfitt, vice president for refining.

Design and engineering contracts for the new research and development laboratories have been awarded to Stone & Webster Engineering Corp. Machine shops and other service departments necessary for complete operation of the project will be constructed. Completion of the project is scheduled next year.

Research will include all phases of the company's operations from exploration through marketing. The company's present research and development laboratory is in Northfield, Ill.

A.C.S. National Meeting May Draw 15,000 Chemists

Fifteen thousand chemists and chemical engineers are expected to participate in the 114th national meeting of the American Chemical Society, which will be held in three sessions in Washington, D. C., St. Louis, Mo., and Portland, Ore., August 30-September 17. The divided national meeting, the first in the Society's history, was arranged to enable the maximum number of the 57,000 members to attend.

The St. Louis meeting, opening

September 6, will feature the study of the relationship of fuel properties to engine design, the future of high-octane gasoline, developments in municipal water purification and recent research in high polymers. The Whitmore Memorial program under the sponsorship of the division of organic chemistry, will also conduct a high polymer forum in which the division of petroleum will participate.

Important advances in petroleum research, production techniques and products will be described at meetings of the division of petroleum chemistry, which will join the division of industrial and engineering chemistry in a session on "Additives for Petroleum Products."

Dr. A. H. Winheim of Planetary Chemical Co., Creve Coeur, Mo., who was recently elected president of the American Chemists Association, is general chairman of the St. Louis session.

Bureau's Bibliography On Oil Analyses Issued

A bibliography of publications containing analyses of both domestic and foreign crude oils analyzed by the standardized Bureau of Mines method during the past quarter century has been compiled and issued by the bureau.

The bibliography designates 115 publications or reports in which nearly 2,500 crude oil analyses have appeared, either as special compilations, in connection with reports of Bureau of Mines research on petroleum, or as special articles for the technical press. The 68-page index lists references to crude oil analyses from 22 states and Alaska as well as 34 foreign countries in both hemispheres. Changes in the names of fields since the original publication of analyses also are indicated.

A free copy of the index, titled "Bibliography of Reports Containing Analysis of Crude Oils by the Bureau of Mines Routine Method," may be obtained by writing to the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

New Texaco Research Facilities Are Under Way

Three new buildings now being erected at the research center of The Texas Co. at Beacon, N. Y., will increase the research facilities there by 40 per cent, Dr. W. E. Kuhn, manager of Texaco's research and technical division, announced.

The new buildings include a new engineering center, housing laboratories for investigational work on volatility, combustion and lubricating problems. A chemistry building will combine 18 complete laboratories to be devoted to research on methods for production of new lubricants. Offices and facilities for servicing these two new buildings will be included in a third building.

Analyses of U. S. Crudes Given in Bureau's Report

A listing of analytical data on crude oils from nearly 85 per cent of the major producing fields of the United States makes up a recent report issued by the Bureau of Mines.

One of the important features of the report is the designation of the type of base of each crude. In addition, a table describes the state and county, producing formation and age, depth, and physical and chemical properties of each crude and residuum.

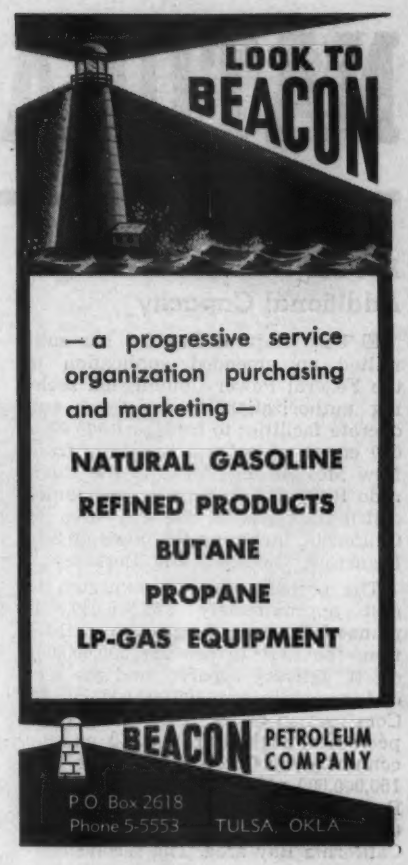
A free copy of the publication, Report of Investigations 4289, "Analyses of Crude Oils from 283 Important Oil Fields in the United States," may be obtained by writing to the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Car Averages 74 Miles To Gallon of Gasoline

Averaging 74.22 miles per gallon of gasoline with a 1937 De Soto and 71.55 miles per gallon with a 1946 Pontiac over a 14-mile course was the accomplishment of two drivers in the annual mileage marathon conducted by Shell Research Laboratories at Wood River, Ill., recently.

The contest was conducted under optimum conditions not found in ordinary driving. Engines were tuned to exact precision, carburetors leaned to minimum mixtures, friction surfaces lubricated to mirror smoothness, tires inflated to abnormal pressures, and driving speeds plotted to tenths of a mile.

THE HEART OF ANY PLANT...
... IS ITS BATTERY OF HEATERS
FOR EVERY PROCESS THERE IS A
BORN UPFLO HEATER
BORN ENGINEERING CO.
TULSA, OKLAHOMA



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RECONVERTING AND
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MACHINERY
IN WORLDWIDE USE
REDUCE DRUM COST
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L. M. GILBERT CO.
DREXEL BLDG., PHILADELPHIA, PA.

NATURAL GAS

El Paso Natural Seeks Additional Capacity

El Paso Natural Gas Co. has submitted an amended application to the Federal Power Commission seeking authorization to construct and operate facilities to transport 400,000,000 cu. ft. of natural gas daily from New Mexico and Texas to the Colorado River for delivery to companies distributing gas in the Bay area of California, including the cities of San Francisco, Oakland, and Berkeley.

The project, which is expected to cost approximately $46,506,059, is planned in two phases of construction, the first to provide 300,000,000 cu. ft. delivery capacity and the second an additional 100,000,000 cu. ft. Construction of the first phase is expected to begin during 1950 and be completed by October 1, 1951, so that 150,000,000 cu. ft. per day of Permian Basin gas can be delivered to the distributing companies supplying the California Bay area. The second construction phase would provide capacity for delivery of an additional 100,000,000 cu. ft. of gas daily from the Permian Basin not later than January 1, 1953.

Facilities in the first phase include a 24-in., 95-mile line from the Benedum field in Upton County, Texas, to the company's Keystone compressor station; a 26 and 30-in. line extending from a point on the company's existing main line to the vicinity of Needles, Calif.; about 191 miles of 26 and 30-in. main line looping; 5,300 hp. in compressor units in existing main line stations and additional field compression, treating and dehydration plants and gathering lines in the Permian Basin.

The second group of facilities would include about 56 miles of 30-in. main line looping, the addition of 23,500 hp. to existing compressor stations, and additional field facilities.

Hearing on Change in FPC Rules Set for September 20

The Federal Power Commission has set September 20 for hearing in Washington on proposed changes in general rules and regulations governing rate schedules and tariffs of natural-gas companies subject to the commission's jurisdiction.

The proposed rules amendment, first made public in April of this year, provides principally for the filing of natural-gas rate schedules in the form of comprehensive tariffs instead of by individual contracts as now permitted.

T.G.T. Seeks Increase In Delivery Capacity

Tennessee Gas Transmission Co. has requested authority from the Federal Power Commission to build facilities increasing the company's delivery capacity by 60,000,000 cu. ft. daily in order to provide that amount to East Tennessee Natural Gas Co. for resale to the Atomic Energy Commission at its plant at Oak Ridge, Tenn.

The construction project, estimated at about $13,350,000, includes approximately 156 miles of 30-in. main line loops and the installation in existing compressor stations of units totaling 6,800 hp. along with miscellaneous facilities.

The increase would bring the company's delivery capacity to 1,060,000,000 cu. ft. daily.

Amarillo Meet to Feature Nitrogen Removal Study

A special meeting sponsored by the U. S. Bureau of Mines in connection with the cooperative study being made of the nitrogen-removal problem by the bureau and the American Gas Association will be held in Amarillo, Tex., August 16-17.

The purpose of the meeting is to enable engineers to obtain greater familiarity with the technical and economic phases of the problem of removing excess nitrogen from natural gas, and prospective means of solving it, particularly by liquefaction and fractionation. The opportunity will also be afforded engineering contractors to present information and proposals on nitrogen-removal plants.

San Juan Pipe Line Is El Paso Natural Affiliate

The recently organized San Juan Pipe Line Co. is controlled by El Paso Natural Gas Co. interests. Paul Kayser, president, and C. C. Cragin, vice president of El Paso Natural, hold the same positions in the San Juan company. C. W. Murchison, president, Delhi Oil Co., which has large holdings in the Barker Dome area, is a director.

Because of difficulty in getting pipe the San Juan 451-mile, 26-in. line, to cost $28,000,000, extending from the San Juan Basin, New Mexico, to a connection with Pacific Gas & Electric Co. near Needles, Calif., cannot be constructed until 1950. Facilities include 100 miles of gathering and feeder lines and a 3,000-hp. compressor station. *(The Oil and Gas Journal, July 8, page 109).*

United Natural Project Gets Temporary Approval

United Natural Gas Co., Oil City, Pa., has been granted temporary authorization by the Federal Power Commission to construct facilities to enlarge its natural-gas transportation and underground storage system in Pennsylvania.

The project, estimated to cost $3,057,500, includes replacement of about 20½ miles of 12-in. pipe line in Elk County, Pennsylvania, with 22¾-in. pipe; construction of about 29 miles of 12¾-in. pipe line between a storage field and a compressor station in Elk County; about 4½ miles of 10-in. or 12-in. line from a proposed storage field to a compressor station in Jefferson County, Pennsylvania; several short connecting lines in Jefferson and Clarion counties and installation of an aggregate of 1,650 hp. in existing compressor stations in Jefferson and Elk counties..

Northern Natural Proposed Facilities Are Approved

Northern Natural Gas Co., Omaha, Neb., has been authorized by the Federal Power Commission to construct facilities to increase its natural-gas transmission capacity north of Clifton, Kans., from 390,000,000 cu. ft. to 425,000,000 cu. ft. daily.

The proposed facilities, estimated to cost $500,300, includes approximately 11 miles of 24-in. loop line beginning at the Clifton, Kans., compressor station and extending north to a point in Washington County; and about 1 mile of 24-in. line at the Mullinville, Kans., compressor station to replace an existing line.

FPC Authorizes New Facilities for Lone Star

Lone Star Gas Co., Dallas, Tex., has been authorized by the Federal Power Commission to construct additional natural-gas facilities in Oklahoma and Texas at an estimated cost of $1,059,500.

Proposed facilities include installation of an aggregate of 2,400 hp. units in Fox central compressor station, Carter County, Oklahoma, and an aggregate of 3,620 hp. units in compressor stations in Cooke, Knox, and Grayson counties, Texas.

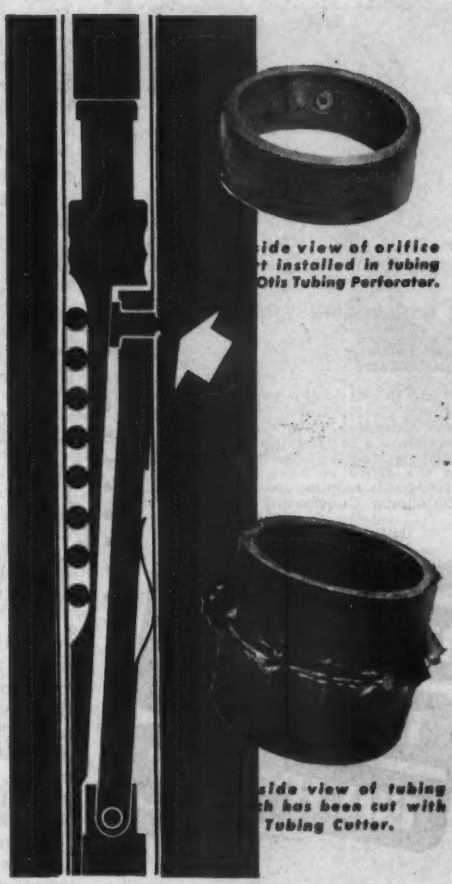
when success is a necessity .. call for the

Otis Wire Line TUBING PERFORATOR

No other operations in the field require more efficient service and dependable equipment performance than perforating or cutting tubing.

The Otis Wire Line Tubing Perforator, mechanically operated, provides a positive means for performing these operations — *without use of explosives, derrick, mast, drilling mud, pulling unit, or tubing crew.*

Run under pressure on a steel measuring line, the Otis Tubing Perforator is set on top of a removable stop which can be installed at any depth. By manipulating the line at the surface, jarring down impacts are transmitted through a set of tubing jars made up on top of the Perforator. This action drives a hardened tooled steel wedge behind a metal punch (or orifice insert plunger). Continued downward movement of the wedge drives the punch, or orifice insert, horizontally into and through the tubing wall (see upper photograph). As many holes or as many orifices of desired sizes as needed can be installed at the same or different depths. The entire operation takes only a few hours and is *safe, simple, and successful.*



ide view of orifice t installed in tubing Otis Tubing Perforator.

ide view of tubing h has been cut with Tubing Cutter.

Otis Wire Line TUBING CUTTER

When cutting tubing in the well is necessary, that operation can also be performed efficiently with the same mechanically-operated tool used in perforating, by replacing the Perforator punch, or plunger, with a tubing cut-off knife. The Tubing Cutter is then run under pressure on a steel measuring line and operated precisely like the Otis Tubing Perforator by applying downward impacts with the jars. After a single cut has been made the tool is pulled to the surface and a spacer ring added to change location of the knife for the next cut. Successive adjacent cuts, made at the same level (see lower photograph) will completely sever the tubing. However, the tubing can usually be pulled in two after a few cuts have been made, leaving the upper end of the remaining portion of the tubing smooth enough to be engaged with an overshot fishing tool.

Use of the Otis Wire Line Tubing Perforator and Otis Wire Line Tubing Cutter is made available through Otis and affiliated wire line service units stationed in the Gulf Coast, Mid-Continent, California, Eastern, and Wyoming areas (see below). Otis Tubing Perforators and Tubing Cutters may be purchased for use outside the continental limits of the United States through Otis Pressure Control Export, Inc.

PRESSURE CONTROL - OTIS - SERVICE - EQUIPMENT

OTIS PRESSURE CONTROL, INC.

CT-197

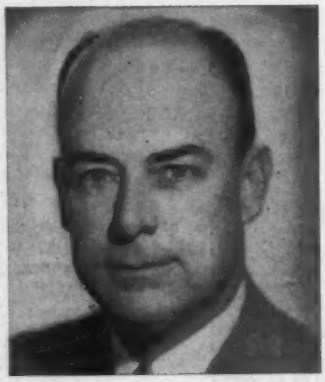
FIELD OFFICES: TEXAS: HOUSTON, CORPUS CHRISTI, ODESSA, and LONGVIEW. OKLAHOMA: OKLAHOMA CITY. LOUISIANA: NEW IBERIA

OTIS ENGINEERING CORPORATION — MANUFACTURE AND DEVELOPMENT

DISTRIBUTORS: OTIS PRESSURE CONTROL, INC., DALLAS, TEX.; OTIS EASTERN SERVICE, INC., BOLIVAR, N. Y.; WESTERN PRESSURE CONTROL, LOS ANGELES, CALIF.

EXPORT SALES AND SERVICES: OTIS PRESSURE CONTROL EXPORT, INC., POST OFFICE BOX 7286, DALLAS, TEXAS, U. S. A.; CARACAS, SOUTH AMERICA

THESE ARE THE
Men Behind the Job
who get the Job Done



With 20 years experience in pipelining, N. K. McFarland, secretary and treasurer, knows what it takes to insure a satisfactory pipeline job—when Mac isn't buried in figures in the office he likes to be out in the field helping to make more Oklahoma Contracting history.

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The Oldest Pipe Line Contracting Company in the Business... Specializing in Oil, Gas and Gasoline Pipe Lines for Over 30 Years

OKLAHOMA
CONTRACTING CO., Inc.
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PIPE LINES

Phillips Begins Work On West Texas Line

Construction work has begun on Phillips Pipe Line Corp.'s 12-in. line from the Goldsmith pool in Ector County, Texas, to Borger.

The initial work consists of laying 7 miles of 12-in. loop this summer, contracted by O. R. Smith. Pipe for the remaining 282 miles of this 289-mile project will not arrive until November; contract for laying this has not been let.

Initial work is on the south end of the line, which will parallel the company's product carrier through which 14,000 bbl. of crude now are being comingled with 13,000 bbl. of natural gasoline daily. Initial throughput is expected to be approximately 50,000 bbl. in the new system which will have a capacity of 70,000 bbl. daily.

The company will handle its own West Texas production when the facilities are completed. Phillips hopes to have production of about 50,000 bbl. daily by that time.

Phillips Pipe Line Is New Name for Standish

Phillips Pipe Line Co. is the new name for Standish Pipe Line Co., crude-oil pipe-line affiliate of Phillips Petroleum Co. The change in name became effective May 13, but no changes were made in the corporate organization now operating under the name of Phillips Pipe Line Co. *(The Oil and Gas Journal, June 24, page 146).*

To preserve the Standish name in areas where the company operated, a new Standish Pipe Line Co. was incorporated in Delaware on May 13 with the intention that it will continue as a dormant corporation.

Phillips Pipe Line Co., now engaged in crude oil transportation, is separate and distinct from Phillips Pipe Line Co. organized a number of years ago for products pipe-line operation and subsequently discontinued. The Phillips products pipeline system continues to be directly operated by Phillips Petroleum Co. as it has been in recent years.

El Paso Progresses on Eunice-Dumas Project

El Paso Natural Gas Co. has laid more than 60 miles of pipe for 248-mile, 24-in. line from Eunice, N. M., to Dumas, Tex. At the time of the latest report, 90 miles of pipe was on hand. The project is being built by an El Paso company spread.

The 601-mile 26-in. looping program to be carried out along the 740-mile, 26-in. Eunice, N. M.-Blythe, Calif., trunk line will not start until next year. For this project 200 miles will be laid in 1949 and 401 miles in 1950. Half of the pipe will come from Consolidated Steel Corp.'s mill at Los Angeles; the other half from Republic Steel Corp.'s Gadsden, Ala., mill.

Michigan-Wisconsin Line Is Progressing

HOUSTON.—Continued progress is being made by J. R. Horrigan Construction Co., Houston, on a 450-mile section of the 24-in. natural-gas line being built by Michigan-Wisconsin Pipe Line Co.

Horrigan is now constructing that part of the line between Hitchland, Tex., and Maryville, Mo. Three spreads are being used, based at Meade, Abilene, and Holton, Kans.

The Meade spread has 270 miles from Hitchland to a point north of Hutchinson, Kans. Approximately 75 miles of this has been completed. The Abilene spread consists of 80 miles from Carlton to Onaga, Kans., and the Holton spread, 100 miles from Onaga to Maryville. Operations on the latter two spreads were begun the middle of June.

Two California Companies To Build 18-Mile Gas Line

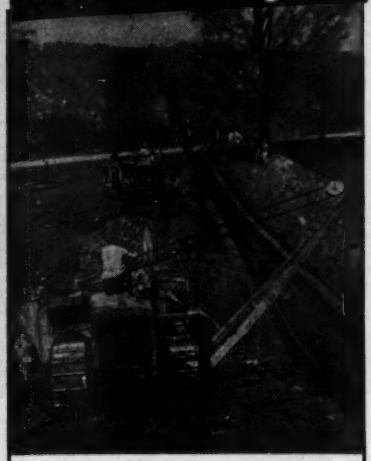
Temporary authorization has been granted to Southern California Gas Co. and Southern Counties Gas Co. of California by the Federal Power Commission for construction of an 18-mile pipe line of 30-in. diameter extending from a point near Rivera, Calif., to the vicinity of Pasadena.

The proposed line would be connected with the existing 30-in. diameter Texas-to-California line.

Alcoa Lays Line to Offshore Gas Wells

Lavaca Pipe Line Co., a wholly owned subsidiary of Aluminum Co. of America, has let a contract to Continental Construction Co., Inc., for laying 11½ miles of 8⅝-in. line from Alcoa's reduction plant site at Point

DEPENDABLY PROTECTED with Reilly PIPE ENAMEL



REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg., Indianapolis
500 Fifth Ave., New York • 2513 S. Damen Ave., Chicago
17 Plants to Serve the Nation

Comfort, near Port Lavaca, Tex., to four gas wells in Matagorda Bay. This is reported to be the largest gas line to an offshore gas field. Work started July 9.

Gas transmitted will be used in connection with electric power generation for the production of aluminum. This will be Alcoa's first peacetime use of electricity generated by other means than water power except for a brief period in the early development of the aluminum industry.

East Tennessee Natural To Build 319-Mile Line

East Tennessee Natural Gas Co., Chattanooga, Tenn., has applied to the Federal Power Commission to construct facilities including approximately 319 miles of 22-in., 16-in., 8⅝-in., and 6⅝-in. of pipe line extending from the system of Tennessee Gas Transmission Co. to Bristol, Tenn.

The proposed facilities would increase the delivery capacity of its previously authorized pipe-line system by 100,000,000 cu. ft. daily. Of this amount 60,000,000 cu. ft. is intended to meet requirements of the Atomic Energy Commission at Oak Ridge and the balance to serve towns and industrial customers in middle and eastern Tennessee. Estimated cost of the proposed facilities totals $14,220,200.

Personnel and materials are now being assembled for construction of East Tennessee Natural's 300-mile line extending from the main line of Tennessee Gas Transmission Co. to a point near Knoxville. This line, estimated to cost about $11,000,000, was authorized by FPC earlier this year.

Buckeye Pipe Line Plans FM, Two-Way Radio

Buckeye Pipe Line Co. has applied for a Federal Communication Commission license in the 30-40 megacycle band for FM two-way radio communication.

Buckeye, parent company of the Northern Pipe Line Co. of Pennsylvania and New York Transit Co., Inc., has pipe lines extending through Indiana, Pennsylvania, Ohio and into New York with branches in Illinois and Michigan. Motorola central station installations will be made in offices and pumping stations at Lima, Cygnet and Toledo, Ohio, and at Samaria and Trenton, Mich. Ultimately two-way radio will cover the entire line. To start, 100 vehicles of the company will be Motorola equipped.

To cover the long distances and mountainous terrain involved, the Buckeye system requires frequencies in the 30-40 megacycle band. In some instances central stations at dispatch

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For BETTER cleaning of
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Pipeline Cleaners Co.
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A PIG FOR EVERY
NATURAL GAS
PIPE CLEANING PROJECT

ILLUSTRATED ARE THREE WILLIAMSON PIGS* FOR CLEANING 24" LINES, ONE FOR 10" LINES

- (Top) **Plow-Type** Scraper for cleaning old, extremely dirty gas lines. Followed by Brush-Type Pig for final cleaning operation.
- (2nd) **Type RN** Pig with 2 sets of rotation nozzles; by-pass gas purges brush bristles; brushes may be shimmed to compensate for wear.
- (3rd) **Type RCN** Pig with single row of rotation nozzles; new compact design for traversing long-radius factory ells. Light weight construction.
- (4th) Small size, **Type RCN** Pig, improved model will negotiate sharp bends; equipped with nozzle plugs for control of by-pass gas.

*Patents pending

THE PIG WITH THE POKE CLEANS PIPE LINES

T. D. Williamson, Inc.
TULSA OKLAHOMA

and pumping points will be as much as 100 miles apart.

FPC Dismisses Wisconsin Southern's Application

The application of Wisconsin Southern Gas Co. for authorization to acquire and operate the Genoa City pipe-line system of Wisconsin Gas & Electric Co. and to construct and operate other related facilities for natural-gas transmission has been dismissed without prejudice by the Federal Power Commission.

Basis for dismissal was that Wisconsin Southern does not have enough gas available to meet the requirements both of its existing customers and of those which it proposed to serve from the Genoa City line, according to the FPC order.

Sinclair Seeks Permit To Take Up 50-Mile Line

Sinclair Refining Co. has requested authorization of the Texas Railroad Commission to take up 50 miles of pipe line from Atcheson Junction to its refinery at Fort Worth.

The refinery which has been shut down will be salvaged and the pipe to be taken up will be put in use elsewhere. An 8-in. line from Muenster, Tex., to Ringling, Okla., will transport oil from the area previously served by the Sinclair line.

Tank-Car Shipments From Morfa Scheduled

Oil from the Morfa tank-car loading station at Wichita Falls, Tex., was scheduled for shipment earlier this week by the Missouri-Kansas-Texas Railroad. The Morfa station, on the Jal, N. M.-Cushing, Okla., pipe line is equipped to handle over 440 tank cars of 8,000 to 10,000 gal. capacity every 24 hours.

The first oil shipments through the 22-in. line reached Morfa early this week. Capacity of the line will be stepped up gradually and is expected to reach its maximum by October.

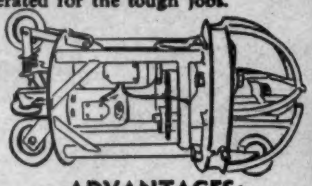
Toronto Begins Work In Tri-Cities Field

Toronto Pipe Line Co., a subsidiary of British American Oil Producing Co., has started construction work on an enlarged gathering and pipeline system in Tri-Cities field of Henderson County, East Texas region. A six-car loading rack between Athens and Malakoff, Tex., is also being planned.

The Toronto company is at present handling over 45,000 bbl. of oil daily, the bulk going to the Gulf Coast and then by tank steamers to its Toronto refinery.

CROSE HAS IT!
INTERNAL LINE-UP CLAMP

The electric model shown below is a rugged, heavy-duty clamp, electrically operated for the tough jobs.



ADVANTAGES:

For The Owners:
Better stringer bead; better finish weld; better pipe line.

For The Builder or Contractor:
Speed; stringer bead cut-out eliminated; economy; swabbing and alignment with one tool; less labor required.

Available for pipe sizes 12" through 36"
Rental or Outright Sale Basis

M. J. CROSE
MANUFACTURING COMPANY, INC.
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FOR CONSISTENT
Corrosion Control
INSIST ON THE GENUINE, ORIGINAL

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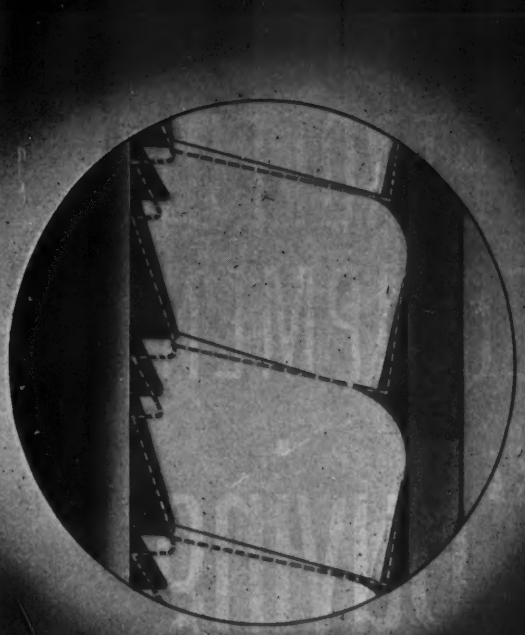

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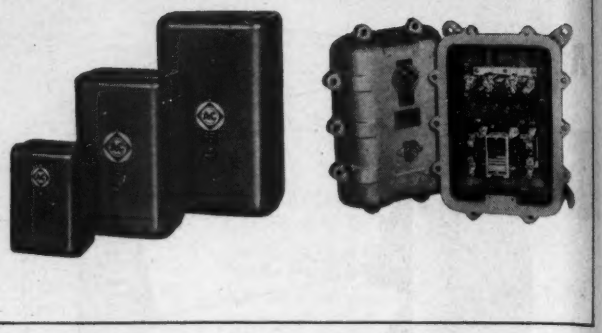

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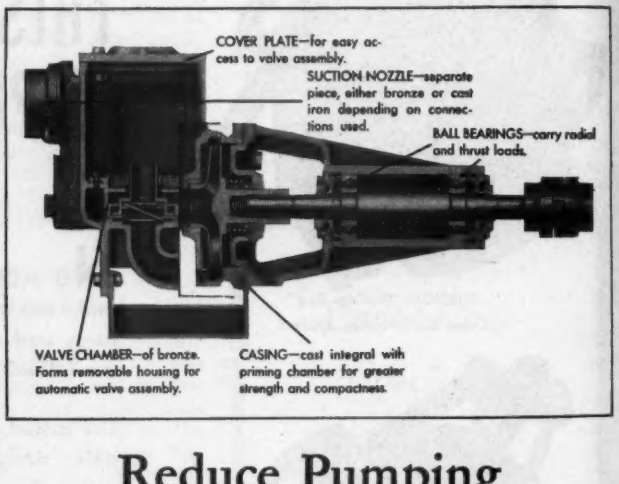
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Groenewold Joins Tulsa Drilling Firm

B. GROENEWOLD

B. E. Groenewold, in charge of drilling equipment and engineering sales for Bethlehem Supply Co. since 1940, has resigned, to accept appointment as chief engineer and assistant to the manager for Exploration Drilling Co., Tulsa, according to Bailie W. Vinson, managing partner. Groenewold was with National Supply Co. for 14 years before going with Bethlehem, serving in the engineering and sales division in Oklahoma and Texas. He is a graduate of the Massachusetts Institute of Technology, and is a member of the Tulsa Engineers club, and the Tulsa Chapter of Nomads.

Exploration Drilling Co. was organized 4 years ago by Vinson and Forrest H. Lindsay. The firm operates 10 drilling rigs, in Illinois, Texas, and Wyoming.

Herb Goodpasture is drilling contractor on the Atlantic Refining Co. 1 McDonald, in NE SW SW 11-21-13, ½ mile east of Rothgarn pool in northern Stafford County, Kansas. It is separated from production in the pool by a dry hole.

Portable Drilling Co. is contractor for the Stanolind Oil & Gas Co. 1 Headman, in SE SW NE 8-24n-12, east of the old Tonkawa field, in Noble County, Oklahoma.

Union Drilling Co. of Calgary, Alta., has the contract for a deep test of the Devonian limestone to be drilled by a group of eight or more companies in 15-50-2w5, in the Blackfoot section of Lloydminster field. Sponsors include Hargal Oils, Royal Canadian Oils, Lloydminster Oil Syndicate, Granleduc Oils, Pacalta Oils, Lingnora Gold Mines, Superior Oils, and Shaw Petroleums.

Helmerich & Payne, Inc., has drilling contract for 10,500-ft. wildcat, Union Production 1 Music, in C SE NW of 25-10n-21w, Beckham County, Oklahoma, south of Elk City field. Derrick is nearing completion.

H-E-R Drilling Co. has contract for Continental Oil Co. 5 Greer, in NW NW SW of 24-23n-1w, Noble County, Oklahoma, in Ceres pool, and is rigging up.

Bell & Burden, Inc., announces that Harry A. Buchanan has joined the firm as general superintendent in charge of all field operations. He came to the company from Loffland Brothers. Neil Norris has resigned from the firm to enter business for himself.

C-G Drilling Co. has contract and interest in Musgrove Petroleum Corp. et al 1 Spangenberg, NW NW SE 16-22-12, Stafford County, Kansas, 1 mile northwest of Spangenberg pool, 1½ miles southeast of Drach pool and 1½ miles west of Heyen pool. Test now drilling close to 2,000 ft.

Falcon Seaboard Drilling Co. is preparing to move in tools to the Edward E. Barry 1 Jacobs, wildcat in SE SE NW of 25-18n-1e, western Payne County, Oklahoma, north of the one-well North Coyle pool.

Fletcher & Randel were drilling below 4,300 ft. at A. G. Hooper, Jr., and C. A. Wiggins 1 Richard Shelly Estate, Franklin Parish, Louisiana, wildcat in Section 2-15n-9e. Contract depth is 5,500 ft. Location is about 2 miles south of production in the Lamar field and 9 miles south of the Delhi area. Both majors and independents are said to be holding acreage in the vicinity of the new test.

Mohawk Drilling Co. has contract for a 3,700-ft. or Hunton lime test for Gulf Coast Western et al A-2 in SW SW NE of 2-10n-6e, Seminole County, Oklahoma, Keokuk area.

Pickrell Drilling Co. has been organized with Lloyd R. Pickrell, Kansas independent operator, as president and Cecil Burton as vice president and drilling superintendent. The new company, which has purchased a new rotary rig, is expected to begin operations August 1.

Falcon-Seaboard Drilling Co. 1 Peyton, in NE NE NW of 22-9n-2e, Pottawatomie County, Oklahoma, southeast of Centerpoint, is rigging up for a 6,000-ft. test.

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Growth.—Kirkpatrick & Bale, Inc., organized in October 1945, now has two rotary mast rigs in operation. Initial activities were in Texas Panhandle field near Pampa. Later, southern Oklahoma claimed the firm's attention. Present activities are engaged in developing production for the firm in the Konawa and Sasakwa areas in the Greater Seminole district in Oklahoma.

H. E. BALE

J. E. KIRKPATRICK

Personnel.—Hubert E. Bale, president; John E. Kirkpatrick, vice president; Mrs. John E. Kirkpatrick, secretary, and Mrs. Hubert E. Bale, assistant secretary.

Sidelights.—John E. Kirkpatrick served with distinction in the Navy during World War II. He served in the South Pacific for 54 months as a commander and participated in several campaigns. He received the Bronze Star medal with gold star and combat "V." Kirkpatrick graduated from the U. S. Naval Academy in 1931 and Harvard University Graduate Business School in 1935. He is a commander of the Oklahoma City Naval Reserve Unit and a director of the Liberty National Bank.

Hubert E. Bale in 1924 received his degree in geology from University of Oklahoma. After graduation, he joined the geological department of Marland Oil Co. In 1926 he became district geologist for Texas Pacific Coal & Oil Co. In 1928 he became associated with W. R. Ramsey in the development of Allen pool in Pontotoc County in Oklahoma. After the discovery of Oklahoma City field, he became associated with William Atkinson, Oklahoma City operator, who was active in Oklahoma City field development. In 1932 he decided to establish a consulting geological practice which he still maintains as Hubert E. Bale & Co.

The firm maintains offices in the Apco Tower in Oklahoma City.

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Exploration and Drilling

Two More Offshore Hits

THE second producing well on the Block 31 lease of Kerr-McGee Oil Industries, Phillips Petroleum Co., and Stanolind Oil & Gas Co., in the Gulf of Mexico, about 10 miles offshore from Vermilion Parish, Louisiana, is the third potential producer in the Gulf tidelands. Just previous to its successful completion, Superior Oil Corp. of California had salvaged an apparently dry hole, and turned it into a potential condensate and gas producer.

The Superior 1-A State, Block 71, about 19 miles offshore from Vermilion Parish, was originally drilled to 13,628 ft., last year, and temporarily shut down. It was then reworked, and attempted to blow out. A string of 7-in. casing was run, and perforated at 9,608-18 ft., for drill-stem test.

After cleaning itself, the well flowed at the rate of 65 bbl. of 52°-gravity condensate with 7,024,000 cu. ft. of gas through a 10/64-in. choke. Flowing pressure was 3,800 psi., and gas-oil ratio about 112,000 cu. ft. per bbl. Derrick is being moved for another wildcat in the vicinity, and testing of the producer is continuing.

The Kerr-McGee et al second producer is a directionally drilled hole from the same platform as the discovery. After first flowing 364 bbl. of oil in 12 hours, it made 647 bbl. in the next 24-hour gage. Both gages were made through a 20/64-in. choke on tubing. The pay interval in the second well is reported at 2,804-24 ft., which compares with 1,734-50 ft., in the first well, which was drilled vertically. The gravity of the oil from the second well is reported as 26.8°, which compares with 24.9°-gravity oil in the first well.

The combination of drilling on a salt dome, where steep dips might be expected, and the comparison of a vertical with a slanted hole create a complicated problem in correlation. Chances are that the geologists, geophysicists, and drilling engineers are even now trying to work out a three-dimensional chess problem. The geometry of the directionally drilled hole, which probably has several different degrees of deviation from vertical, increasing with depth, makes up one big part of the problem.

The probable normal dips toward the flank of the dome, as estimated from seismograph records, core orientation if available, or other methods of estimating dip from a single hole, make up another big item. If the paleontologists can find some sharply distinctive boundary-marker fossils (highly doubtful) this would help. Then there is the comparison of electric logs, after allowing for the geometry of the directionally drilled hole. The problem of creating two vertically comparable electric logs out of the two logs available is no mean task.

As for the Superior strike, this only brings the problem of what to do about offshore gas pipe lines into more prominence. Magnolia Petroleum Co. is still testing an offshore well off Terrebonne Parish, trying to make an oil well, even though either of two gas sands encountered would make 10 to 15 million cubic feet per day.

Oil can be barged to shore at present prices and transportation costs. Gas, dry or wet, can only be piped. So the problem of laying pipe lines from offshore wells to land seems to be coming to a head. This isn't a problem of laying a trunk pipe line of large size, where heavy investment in a small portion of the line for a water crossing is not too important. This is a problem of laying gathering lines from 1, or at most 10 or 15 wells, at not too great a cost. This will cause a lot of head scratching.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTH LOUISIANA.—According to latest reports, second producer in a new sand in the recently opened field in the Gulf of Mexico off Terrebonne Parish, has been found by Kerr-McGee. The 2-32 State, in the Ship Shoal area, flowed 335 bbl. of oil in 12 hours through perforations at 2,808-24 ft. Tubing pressure 200 psi. The discovery well was completed at 1,734-50 ft.

ROCKY MOUNTAIN AREA.—Bay Petroleum Corp.'s Lodgepole wildcat in Weston County, Wyoming, swabbed at the rate of 15 bbl. of oil per hour on initial tests after casing was cemented. Operators are moving in heavier equipment to swab through casing in cleaning the well prior to installing pump. Stanolind's Bar-X well, Grand County, Utah, is being credited as a Morrison gas discovery, but the well will probably be drilled on to test the Weber. Shows of oil have been encountered at Stanolind's Big Sand Coulee wildcat, Park County, Wyoming, in the Frontier below 10,000 ft., and in Washakie County, General Petroleum cored saturation in the Tensleep at its North Sand Creek wildcat.

ARKANSAS.—Stanolind & Continental's 1 Mitchell, deep test in the shallow Shongaloo field of Webster County, is a possible distillate discovery in the Cotton Valley. The well recovered 930 ft. of gas and distillate-cut mud on drill-stem test at 9,003-17 ft. and 450 ft. of distillate at 9,021-61 ft.

PERMIAN BASIN.—Magnolia Petroleum Co. 1 Winston Bros. may confirm a possible large Pennsylvanian producing area in southwest Scurry County. The well is showing for production from an unusually thick section of Canyon lime, and is running 18 ft. higher than Sun Oil Co.'s 1 Schattel, recent Canyon lime discovery 3½ miles to the southwest.

TEXAS GULF COAST.—Pan American Producing Co. 1 Lang made 3 bbl. of oil per hour on tests to open a new pool in the Cottonwood Creek area of DeWitt County, just southwest of a recent gas discovery and 2 miles northeast of Holly field.

TEXAS GULF COAST

New Oil Pool and Gas Pay Opened Near Coast

HOUSTON.—Pan American Production Co. 1 Paul Lang, discovery oil well in the Cottonwood Creek area of DeWitt County, approximately 3 miles northwest of Meyersville, is testing through new perforations at 7,625-26 ft. and reported making approximately 3 bbl. of oil per hour with no water. Tubing pressure 1,370 psi. Total depth is 7,784 ft., with 5½-in. casing at 7,700 ft. Top of Massive sand is 7,616 ft. This well is located in James Duff League, A-153, approximately 4,400 ft. southwest of the Arkansas Fuel 1 Buehrig gas discovery well, and 2 miles northeast of Holly field.

Danciger Oil & Refining Co. 1 J. W. Baass, new gas discovery well approximately 8 miles southwest of Victoria in Victoria County, gaged 38,900,000 cu. ft. of gas per day on open flow through perforations at 4,618-20 ft. Shut-in pressure on tubing was 1,905 psi. Through a ½-in. choke, the well made 663,000 cu. ft. of gas with 1,890 psi. working pressure. It is located in the F. G. Hidalgo Grant, A-61, 3½ miles southeast of Raisin. Total depth 5,188 ft., with 5½-in. casing set to 4,676 ft.

Harris field of Live Oak County has been extended southwest by Continental Oil Co. A-2 Frank C. Goodwin, in Jose de Jesus Rodriquez Grant, which gaged 16,200,000 cu. ft. of gas per day on open flow, and flowed 29 bbl. of condensate with 2,372,000 cu. ft. gas per day through an 11/64-in. choke, with 3,540 psi. tubing pressure, and 3,710 psi. shut-in pressure. Production is through perforations at 8,582-6,602 ft. in the deep pay zone (Massive Wilcox sand). Total depth is 8,675 ft. with 7-in. casing on bottom.

Skelly Oil Co. 1 R. C. Millican et al, a northwest extension gas-condensate producer for the East Bay City field in Matagorda County, flowed 7½ bbl. of 42.3°-gravity condensate per day along with 1,566,000 cu. ft. gas per day through a ¼-in. choke, through perforations at 10,352-74 ft. Tubing pressure on the flow test was 3,590 psi. and 3,813 psi. when shut in. Open flow calculation was estimated to be 50,000,000 cu. ft. of gas per day.

Cities Service Oil Co. 1 David Rorick, in North Delhi field of Harris County, opened a new sand for the field. Top of new sand 7,252 ft. with perforations at 7,274-80 ft. and from 7,252-63 ft., and completed through the tubing, flowing 2,500,000 cu. ft. of gas per day along with 31 bbl. of 53.8°-gravity condensate per day, flowing pressure 1,622 psi. shut-in 2,602 psi. Well was dual-completed, with perforations from 7,050-56 ft. and completed through the casing. On gage, the well flowed 2,500,000 cu. ft. of gas per day and 32 bbl. of 54.8°-gravity condensate with 1,622 psi. pressure on casing. Total depth is 7,604 ft.

The 47 new locations reported this week for Districts 2 and 3 included 11 wildcat starts, 2 each in Brazoria and Lavaca, and 1 each in Bee, Chambers, Fort Bend, Jackson, Matagorda, Montgomery, and Wharton counties. Two exploratory tests were successful, opening a new oil pool in Orange County and a new gas pay in South Inez pool of Victoria County. Eight wildcats were dry, two in Bee, and one each in Brazoria, Harris, Jackson, Live Oak, Orange and Refugio counties.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Orange County: New oil discovery—Placid Oil Co. 1 Wm. Winfree, C. West Sur., 1 mi. off NE flank Orange dome, TD 8,095 ft., top sand 7,675 ft. Lower Frio, perf. 7,710-15 ft., IP: 321 bbl. oil per day through 10/64-in. choke, GOR 556, TD 800 psi., CP 1,500 psi., gravity 42°, no water.

Victoria County: New gas pay South Inez pool—Cities Service Oil Co. 2 Mrs. S. H. Baker, in Valentin Garcia Sur., 4 mi. SE of Inez, top pay 5,116 ft., TD 6,259 ft., perf. 5,116-30 ft., IP: 93,000,000 cu. ft. gas per day, open flow, 2,025 psi. WP on 3/16-in. choke, no water.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: Bridwell Oil Co. B-1 H. C. Wood, in James McGreehan Sur., A-38, 1 mi. E-NE of South Blanconia field, dry, TD 4,802 ft.

H. R. Smith-Seaboard 1 Bernard Segar, Geo. O'Docharty Sur., A-49, 5 mi. S of Beeville, dry, TD 4,316 ft.

Brazoria County: Sun Oil-Geo. R. Brown & W. A. Smith 1 Mount Rose Land Corp., Chenango area wildcat, in Wm. Harris Lge. A-71, 1 mi. N of Chenango field production, dry, TD 10,102 ft.

Harris County: Placid Oil Co. and Sun Oil Co. 1 George Tharp et al, John Merry Sur., A-49, 1 mi. NW of Huffman townsite, dry, TD 9,015 ft.

Jackson County: L. R. Mabry & Bonnie B. Smith 1 Miller, in R. Musquez Grant, 2½ mi. N of Inez, dry, TD 6,382 ft.

Live Oak County: J. Garfield Buell & H. Roles 1 W. J. Nichols, in Pat Henry Sur., 4 mi. W of Three Rivers, dry, TD 1,663 ft.

Orange County: McCarthy O. & G. Corp. 2 Lutcher-Moore Lbr. Co. et al, in David Odom Sur., 7 mi. NW of Orange townsite, dry, TD 9,020 ft.

Refugio County: Hewit & Dougherty H-1 F. B. Rooke & Sons, in Antonio de la Vina Sur., ¾ mi. S of Woodsboro, dry, TD 6,096 ft.

MICHIGAN

Allegan County Wildcat Rated at 80 Bbl. Daily

SAGINAW.—Among the 14 oil and gas completions for the week in Michigan was J. W. Lang Co.'s wildcat in Heath Township, Allegan County, rated after acid at 80 bbl. a day, with salt water. Gulf Refining Co. was continuing testing of its 1 State-Sylvan wildcat in Osceola County, confident it will be a heavy producer. The well before being cleaned flowed by heads on several occasions. Gulf plans to acidize.

The completions for the week included six oil wells, three gas wells, five dry holes, of which four were wildcats. A total of 27 new drilling locations were announced, 9 being for gas in Clare County, most of the others for oil, including 5 locations in Allegan County, 3 each in Mecosta and Osceola, 2 in Van Buren, 1 each in Ionia, Mason, Oceana, Montcalm, and Gladwin.

Best of the new producers was Carter Oil Co. 1 Thamansauky, in the Oceana County Pentwater field. Its initial potential was 700 bbl. a day. Other producers were in Midland, Van Buren, Bay and Kalkaska.

MICHIGAN SUCCESSFUL WILDCAT

Allegan County, Heath Township: J. W. Lang Co. Lelia Boyse, public administrator, NE NE NE 14-3n-14w, pumping 80 bbl. with salt water, acidized, in Traverse limestone, TD 1,523 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Overisel Township: Ford Oil Co. 1 Sena TerHaar, NE NW SE 4-4n-14w, acidized dry after show of oil in Traverse limestone, TD 1,536 ft.

Muskegon County, Casnovia Township: Rex Oil & Gas Co. 1 Morris Sternburgh, SE NW SW 27-10n-13w, dry in Detroit River, TD 2,626 ft.

Newaygo County, Denver Township: E. L. Bourett 1 Arthur & Amy Jones, SE NW SE 4-14n-14w, dry in Traverse limestone, TD 2,134 ft.

Home Township: Leonard Oil, Inc., 1 Frederick A. Berg, NE NE NW 19-16n-12w, dry in Traverse limestone, TD 2,677 ft.

SOUTHWEST TEXAS

New Oil Field in Hidalgo; Gas in San Patricio

CORPUS CHRISTI.—A new oil field for Hidalgo County, 4 miles south of the La Reforma field, has been completed through perforations at 5,967-69 ft., and gaged 24 bbl. of oil in 16 hours through an 11/64-in. choke, with gas-oil ratio of 92,000. No water in the flow. Total depth is 9,120 ft., with 7⅝-in. casing set to 7,324 ft. Top of Vicksburg zone at 7,220 ft. This well is located in El Benadito Grant, in northwestern Hidalgo County.

New gas production has been opened at F. M. Boykin, Jr., A-1 C. V. Jones, a deepening job in the old Paul Benedum 1 Jones dry hole, approximately 1 mile southwest of the Midway field in San Patricio County. Total depth is 7,506 ft., with perforations for completion at 6,578-86 ft., and completed for an estimated 9,000,000 cu. ft. of gas per day on open flow, and gas-condensate ratio of 31,280. Shut-in pressure was reported at 2,360 psi., and gravity of condensate 64°. This well is located in Section 67, George H. Paul's Subdivision of Coleman-Fulton Pasture Co. lands, 4 miles south of Taft.

Approximately 4 miles southwest of Catarina, and in Dimmit County, Henderson Coquet and Algord Oil Co. 2 H. A. Dillon has been completed in the Navarro sand. The well was swabbed in and filled all storage on the lease with 42°-gravity amber-colored crude. Pumping equipment will be installed. Total depth is 5,210 ft., with plugged-back depth 4,932 ft. Completion is through open hole at 4,890-4,932 ft. in Navarro sand, topped at 4,900 ft. This well is in GWT&P Survey 41, A-110, on Lot 2, Block 111, Taft Catarina Farms Subdivision "C."

There were 27 new locations reported for Districts 1 and 4, of which 6 are new wildcat starts, 1 each in Atascosa, Jim Wells, Kleberg, San Patricio, Val Verde, and Williamson counties. One successful wildcat opened a gas-condensate pool in San Patricio County while nine wildcats were dry, two each in Edwards and Guadalupe, and one each in Atascosa, Gillespie, Milam, Williamson, and Zavala counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCAT

San Patricio County: New gas-condensate pool (unnamed)—F. M. Boykin, Jr., A-1 C. V. Jones, NE/4 Sec. 67, Geo. H. Paul's Subd. of Coleman-Fulton Pasture Co. lands, 4 mi. S of Taft and approx. 1 mi. W of SW ext. area of Midway field, old well drilled deeper, old TD 5,420 ft., new TD 7,506 ft., top pay 6,578 ft., perf. 6,578-86 ft., IP: 9,000,000 cu. ft. gas per day on open flow, ratio 31,250 shut-in pressure 2,360 psi., gravity 60°, no water.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Atascosa County: Carlyle Lynton 1 J. G. Callan, in J. S. Loving Sur., 194, A-542, 4½ mi. N of Campbellton, dry, TD 6,000 ft.

Edwards County: V. J. Meyer 1 S. N. Brown, GWT&P RR Co. Sur., 11 mi. W of Rock Springs, dry, TD 235 ft.

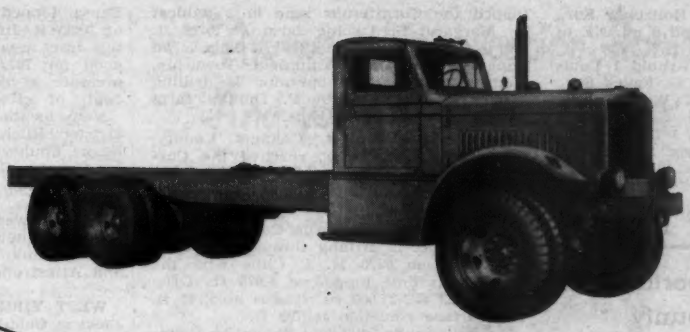
John T. Wade, T. B. Atkins & A. R. Powell 1 Jim Wheat, NW SE Sur. 175, 7 mi. fr. N & W lines of county, dry, TD 665 ft.

Gillespie County: Ed Rips 1 Richard Stehling, in Amanda Stehling Sur., Sec. 858, 4 mi. N of Fredericksburg, dry, TD 502 ft.

Guadalupe County: L. W. Caps, Jr., 1 Walter Zuehl, in Clairborne Rector Sur., 1½ mi. S of Marion, dry, TD 875 ft.

G. C. Schoonmaker 1 T. M. Jeffers, in Edward C. Pettus Sur., 3.7 mi. SW of Luling, 2 mi. NE of E end of Darst Creek field, dry, TD 2,950 ft.

Milam County: K. & G. Oil Co., Inc., 1



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WRITE FOR LITERATURE

E. J. Horton, in B. W. Holtzclaw Sur., 8 mi. SW of Cameron and 6 mi. NE of Rockdale, dry, TD 1,800 ft.

Williamson County: Ralph Arnold 1 Louis C. Anderson, in James C. Eaves Sur., A-2071 and A-2172, 4 mi. W of Taylor, dry, TD 1,100 ft.

Zavala County: Sun Oil Co. 1 D. M. Pryor et al, in Antonio Aguirre Sur. A-1, 7 mi. NE of La Pryor, dry, TD 2,564 ft.

APPALACHIAN FIELD

Cabot Making Important Test in Monroe County

PITTSBURGH.—In Wolf Creek district, Monroe County, southeastern part of West Virginia, Godfrey L. Cabot, Inc., topped the Corniferous lime in a wildcat on Margaret S. Twohig farm at 6,449 ft. and set 5-in. casing at 6,459 ft. This is an important test. In Springfield Township, Monroe County, this operator is drilling a wildcat on Elizabeth P. Dunlap farm which is fishing at 6,344 ft.

In Sheridan district, Calhoun County, Godfrey L. Cabot, Inc., reached the Corniferous lime in the wildcat on Mary V. Bunner lease and shut down to run 7-in. casing at 4,708 ft.

In Elk district, Kanawha County, United Fuel Gas Co. is drilling through the Oriskany sand in 6270 M. J. Cline with the Corniferous lime topped at 4,975 ft., Oriskany 5,123 ft., 37,000 cu. ft. gas at 5,140 ft. The surface elevation is 725 ft.

In Baileysville district, Wyoming County, United Producing Co. completed 1485 W. M. Ritter Lumber Co. with a final gage, after shot, of 2,363,000 cu. ft. gas from the Berea, topped at 3,650 ft. and total depth of 3,685 ft. In Center district, No. 1530 on this tract was completed in the Berea and good for 787,000 cu. ft. gas with a rock pressure of 650 psi. 72 hours from a total depth of 3,170 ft.

New locations totaled 12 and in Clay district, Ritchie County; Spencer district, Roane County; Booths Creek district, Taylor County; Grant district, Wayne County; Center and Oceana districts, Wyoming County.

In southwest Pennsylvania, there were only two new locations and these were in Red Bank Township, Armstrong County and Armstrong Township, Indiana County.

WEST VIRGINIA WILDCAT FAILURE

Jackson County, Union district: Columbian Carbon Co. 1067 G. F. White, dry, shale shot 3,232-3,632 ft. with no results, TD 3,642 ft.

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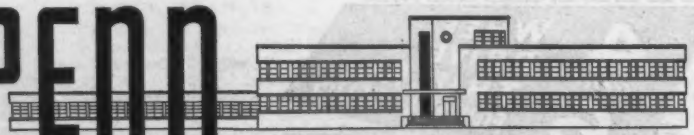

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SOUTH LOUISIANA

Superior Opens Field Farthest Out in Gulf

NEW ORLEANS.—In Block 71, 19 miles out in the Gulf of Mexico off Vermilion Parish, Superior Oil Co. 1-A State flowed at the rate of 65 bbl. of 52°-gravity condensate per day to open a field farthest out on the Continental Shelf. Original total depth was 12,926 ft., operators moved in and cleaned out to a depth of 9,680 ft., and completed through perforations at 9,608-18 ft., for 65 bbl. of 52°-gravity condensate per day through 10/64-in. choke along with 7,024,000 cu. ft. of gas. Superior will drill a second test from the same drilling platform as the 1-A, which will be the 2-A Gulf of Mexico-State, and will be drilled in a northerly direction from the discovery well.

Kerr-McGee 1 State, Lease 750, Block 28, a deep test in the Ship Shoal area of Terrebonne Parish, has attempted to blow. Total depth is 14,071 ft. Several sands with good odor have been encountered in the 8,400-ft. and 8,500-ft. levels. Log was run to 10,484 ft., and took sidewall cores between 7,763 ft. and 10,367 ft. Slight show of oil was found in samples from 10,572-74 ft. Sand topped at 13,973 ft. showed gas and condensate. Operators drilled to total depth of 14,071 ft., and well attempted several times to blow out, but was controlled. Mud is being conditioned and operators are going back in the hole to resume operations.

Magnolia Petroleum Co. 1 Ship Shoal Lease 766, Block 72, wildcat test located 8 miles south of Coon Pointe production in the Gulf of Mexico, has been drilled out and operators are preparing to resume testing below 7,000 ft. On previous tests in the 7,000 ft., 7,200 ft., and 7,300 ft. levels showed considerable gas. Pipe has been reperforated from 7,306-08 ft. and on drillstem test using ¼-in. and ⅛-in. chokes the well flowed dry gas. Flowing pressure on tubing was 2,650 psi. Total depth is 9,355 ft. with top of salt at 8,290 ft.

Kerr-McGee 2-32 State-Ship Shoal wildcat in Block 32 discovery area of Terrebonne Parish is bottomed at 3,238 ft., with 5½-in. liner at 3,211 ft. Pipe has been perforated from 2,834-36 ft. and 2,790-92 ft. for squeeze jobs, and operators are preparing to reperforate for a production try.

The 15 new locations reported this week included 3 wildcat starts, 1 each in Cameron, Lafourche, and St. Landry parishes. Two successful exploratory tests were completed, one each in Acadia and St. Landry parishes. One wildcat was dry in Vermilion Parish.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Acadia Parish: New gas-condensate discovery—J. C. Hawkins et al 1 Dolussa Vidrine Young, 19-7s-2w, between Tepetate and West Tepetate field, TD 9,157

ft., top sand 8,530 ft., perf. 8,539-36 ft. in Marginulina Texana, IP: 92 bbl. condensate per day and 5,000,000 cu. ft. gas per day through ¼-in. choke, GOR 54,-300, TP 2,525 psi., gravity 60.4°.

St. Landry Parish: Extension to Cankton field—Superior Oil Co. 1 Louis Savoie, 37-8s-3e, 1¼ mi. S of Cankton field west side production, TD 11,024 ft., top sand 10,550 ft. (Lower Broussard sand), perf. 10,550-60 ft., IP: 30 bbl. condensate per day and 3,800,000 cu. ft. gas through ¼-in. choke, ratio 125,667, TP 4,300 psi., shut-in pressure 4,550 psi., gravity 49.7°, no. water.

SOUTH LOUISIANA WILDCAT FAILURE

Vermilion Parish: Stanolind O. & G. Co. 1 Robert D. Trahan, in East White Lake area, 18-13s-1e, dry, TD 13,308 ft.

MISSISSIPPI

Two Producers Completed In Carthage Point Field

JACKSON.—Approximately 3 miles northeast of production at Yellow Creek field, Wayne County, Walter E. Sistrunk 1 Ralph Stanley, 8-9n-7w, recovered 35 ft. of drilling mud with slight show of oil and no water on 20-minute drill-stem test from 4,844-57 ft.; ¼-in. top and bottom chokes were used. Top of chalk at 3,845 ft., and top of Eutaw 4,838 ft. Two feet of oil sand was recovered in core from 4,854-57 ft. Operators are now coring ahead.

In the Spring Cottage area, Marion County, Humble Oil & Refining Co. 2 Ford was perforated from 9,037-39 ft. Production packer was run on 2½-in. tubing and packer was set at 8,988 ft. Well was washed and swabbed for 3½ hours and then kicked off. On varying chokes, ⅛-in. and ¼-in., well flowed at rate of approximately 50 bbl. per day, estimated to be 50 per cent oil and 50 per cent salt water. Tubing pressure built up to 375 psi., but at end of 3 hours had dropped to 250 psi. Operators are continuing to run flow tests.

Pure Oil Co. completed two producers in Carthage Point field, Adams County. The 3 George W. Armstrong, 13-6n-3w, was completed flowing an initial production of 315 bbl. of condensate plus 3,795,000 cu. ft. gas per day, through ¼-in. tubing choke; tubing pressure 3,100 psi., gravity 54.2°, ratio 11,000. Total depth is 10,257 ft. with perforations at 10,249-57 ft. The 1 Armstrong-McDowell Unit, 13-6n-3w, was drilled to total depth of 10,262 ft., and was completed through perforations at 10,224-62 ft., for potential of 290 bbl. condensate plus 6,525,000 cu. ft. gas per day, through ¼-in. tubing choke; tubing pressure 3,100 psi., gravity 54.2°, ratio 22,500.

At Mallalieu field, Lincoln County, Humble 1 W. T. McClellan, 19-6n-8e, was completed flowing 396 bbl. of 39.1°-gravity oil per day through a 12/64-in. choke. Total depth is 10,489 ft., and perforations are from 10,452-82 ft.

Five wildcat starts were reported for Mississippi, two in Adams and one each in Franklin, Warren and Yazoo counties. Six development locations are two each in La Grange field and Yellow Creek field, and one each in Cranfield and Mallalieu fields.

MISSISSIPPI WILDCAT FAILURES

Copiah County: Cities Service Oil Co. 1 C. S. Bailey, C SW SW 24-1n-1w, dry, TD 10,008 ft. Marine Tuscaloosa 9,550 ft., Lower Tuscaloosa 9,667 ft., Massive sand 9,850 ft.

Issaquena County: Burns & Miller 1 Anderson-Tully, SW SE 26-9n-8w, dry, TD 5,016 ft. Tuscaloosa 4,252 ft., First sand 4,257-68 ft.

Jefferson County: The California Co. 1 Heckler-Logan Unit, 6-10n-1w, dry, TD 9,559 ft. Tuscaloosa 8,775 ft., Marine Tuscaloosa 9,180 ft., Lower Tuscaloosa 9,355 ft., Massive sand 9,460-75 ft. and

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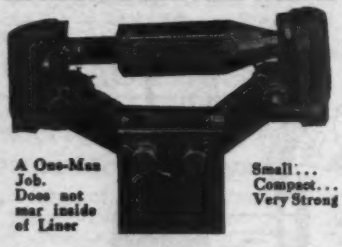

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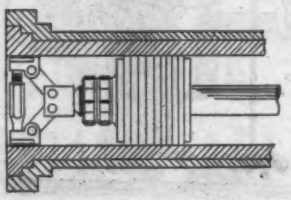

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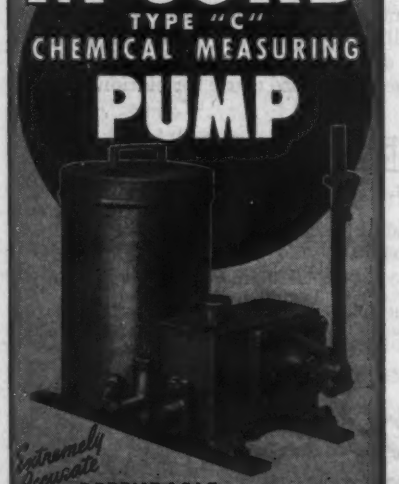

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9,489-9,502 ft., Lower Cretaceous 9,508 ft.

Marion County: Parker Drilling Co. 1 Allen Simmons, SW SE 35-4n-16w, dry, TD 10,005 ft., Austin 8,125 ft., Base Austin 8,430 ft., Marine Tuscaloosa 9,260 ft., Lower Tuscaloosa 9,580 ft., Massive sand 9,822 ft.

Rankin County: Lion Oil Co. 1 Morrow, SE NW NW 19-3n-5e, dry, TD 8,900 ft. Marine Tuscaloosa 8,390 ft. Lower Tuscaloosa 8,538 ft., Massive sand 8,685 ft., Lower Cretaceous 8,798 ft.

FLORIDA WILDCAT FAILURE

Columbia County: Humble Oil & Refg. Co. 1 J. T. Cone, SE NW 22-1n-17e, dry, TD 4,444 ft.

EASTERN TEXAS

Hopkins County Test Shows for Production

DALLAS.—Shell Oil Co., Inc. 1 Heydrick, George Halyard Survey, 6 miles southeast of Sulphur Bluff in Hopkins County, was showing for production in the Paluxy sand. The Paluxy was topped at 4,505 ft., and at 4,508 ft. the first drill-stem test, open 35 minutes, recovered 90 ft. of oil plus 270 ft. of oil and gas-cut mud. A core to 4,517 ft. was said to have recovered sandy shale with no shows, but from 4,517-28 ft. it logged 3 ft. of sand, and cores from 4,528-38 ft. recovered 10 ft. of hard, tight sand and sandy shale bleeding oil. A second drill-stem test, between 4,535-47 ft., recovered 950 ft. of 18°-gravity black oil.

About 2 miles south of Sulphur Bluff, Delta Drilling Co. et al 1 Wilson reported fair to good porosity in sand samples from 5,925-55 ft., having black dead-oil stains. It was drilling ahead below 6,275 ft. The sand formation was not identified.

A third pay zone for the Quitman field of Wood County, now producing from the Paluxy and sub-Clarksville, was indicated by Rogers Lacy, Inc. 2-A Cox, in the Barfield Survey. A 20-minute drill-stem test from 4,350-59 ft. was said to have recovered 1,480 ft. of oil. Further details were not available.

In Cherokee County, R. J. Caraway 1 Session, Jose Maria Musguez Survey, 9 miles east of Rusk, had total depth at 4,502 ft. in sand and shale and was testing into pits after making a short wild flow of gas. On 14/64-in. choke on tubing, it made an estimated 1,750,000 cu. ft. of gas a day, with no distillate. There was a possible light spray of salt water. Flowing tubing pressure was 1,150 psi., with 1,550 psi. on the casing. When perforations were made between 4,402-04 ft., and washed with fresh water, swabbing through tubing failed to reduce the fluid level which was at the surface. On the sixth trip of the swab it blew in, finally blowing the swab from the hole. It was allowed to blow through open 2-in. for 1½ hours before being shut in.

Humble Oil & Refining Co. 1 First State Bank of Tenaha, second well in the Patroon area, Shelby County, was coring the Glen Rose below 5,245 ft. Cores between 5,200-15 ft. recovered dark gray shale, hard dense lime and tight oolitic lime with streaks of shale and no shows. Oolitic lime with some oil shows was logged between 5,215-30 ft. Top of the upper Glen Rose was 4,495 ft.

In Navarro County, Hunt Oil Co. 1 E. E. Hamilton, 3 miles west of Corsicana, was drilling sand and shale below 4,713 ft. It had the Massive anhydrite at 4,070-80 ft., by samples.

General Crude Oil Co. 1 Ed F. Swift estate, 3½ miles northeast of Eunice in Leon County, was drilling sandy shale at 6,440 ft. It drilled soft sand from 6,406-16 ft., with no shows, logged the Austin chalk at 5,992-6,002 ft., and topped the sub-Clarksville at 6,352 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURE

Cherokee County: R. J. Caraway 1 O. M. Walker, J. M. Musquez Sur., 10 mi. E Rusk, dry, TD 4,459 ft., Austin 4,239 ft., Woodbine 4,442 ft., elev. 327 ft.

LA.-ARK.

Shongaloo May Produce From Cotton Valley Pay

SHREVEPORT.—Stanolind Oil & Gas Co. and Continental Oil Co. 1 Viola Mitchell, wildcat deep test in the shallow Shongaloo field of Webster County, in 31-23n-9w, was showing for a possible distillate discovery in the Cotton Valley formation. Cores from 9,010-17 ft. yielded hard sand with fair odor. A 45-minute drill-stem test from 9,003-17 ft., using ¼-in. chokes and 1,000 ft. of water cushion, recovered the cushion, plus 930 ft. of gas and distillate-cut mud. Bottom-hole flowing pressure was 150 psi.

Cores from 9,019-61 ft. recovered 42 ft. of sand and sandy shale, having fairly good porosity, slight odor and stain throughout. A test from 9,021-61 ft., open 20 minutes, recovered water cushion, plus a reported 450 ft. of distillate. Bottom-hole flowing pressure was 800 psi., increasing to 3,900 psi. when shut in. Later reports carried some question as to the 450 ft. of distillate. On last report it was coring below 9,067 ft., believed to be in shale.

C. H. Osmond et al 1 Wilkerson, 15-21-12e, Tensas Parish, squeezed all perforations and was waiting on cement. It had shown salt water and distillate and operators believed the water was from a channel job. Total depth is 9,801 ft., in the Paluxy, drilled out to 8,814 ft. Perforations were from 8,780-8,804 ft. The well would not flow but after swabbed 10 hours it began to make a small amount of gas, distillate and salt water.

In Ouachita Parish, The California Co. 2 Breece, 30-17n-5e, had total depth at 9,014 ft. and was coring the Cotton Valley with diamond bit. Recovery from 8,953-68 ft. was 15 ft. of hard sand and shale with no shows. The same company's 2 Maxey, 32-18n-1e, was drilling in the Cotton Valley below 9,102 ft. It had the James lime at 5,191 ft., Pettit porosity at 5,451-71 ft., Travis Peak at 5,694 ft., and Cotton Valley shale at 8,894 ft.

H. C. Hunt 1 Louisiana Delta, 1-4n-4e, LaSalle Parish, had total depth at 9,900 ft. in the Tuscaloosa, and was reaming down. Cores from 9,881-9,900 ft. recovered sand and shale with no shows. Hassie Hunt 1 Whitney Corp., 19-10n-13w, Sabine Parish,

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was drilling in the Glen Rose at 4,295 ft. Hunt Oil Co. 1 Goodwin, 21-23n-7w, Claiborne Parish, was drilling below 4,870 ft. in the James limestone. It is a new wildcat operation 1 mile southeast of the East Haynesville area. Projected depth is 11,000 ft.

In Union Parish, a new operation on the west edge of the abandoned Oakland field is Ewing & Williams 1 Templeton, 13-23n-1w, which was drilling below 2,050 ft. In Webster Parish, Barnsdall Oil Co. 1 Sykes, 1-22n-9w, had total depth at 5,800 ft. in the lower Glen Rose. Cores at 5,670-88 ft. had some porosity, spotted oil stains and odor. It was running electrical survey.

In Union County, Arkansas, Curtis A. Kinard 1 W. B. Scales, prospective Smackover discovery in 3-18s-17w, was to run electrical surveys and set casing before making further tests. The test has attracted considerable interest as having an unusually thick pay section indicated. Total depth was 7,874 ft. Cores from 7,769-7,833 ft. showed fair to good porosity, stain and odor. Reports placed Smackover top at 7,715 ft., with porosity indicated from 7,753-7,834 ft. Another source credited the well with 100 ft. of saturated lime, from the top at 7,720 to the lowest core at 7,832 ft.

Other wildcat reports were: J. H. Williams 1 Hunnicutt, 27-7s-18w, Clark County, drilling below 2,022 ft., thought to be Pennsylvanian. McAlester Fuel Co. 1-A Black, 24-15s-21w, Columbia County, waiting on standard rig for testing, at total depth of 6,541 ft., in the Smackover. Joe W. Kinzey 1 Jones, 31-4s-15w, Grant County, bailing salt water with scum of oil at 1,209 ft. in the Midway. Stanolind Oil & Gas Co. 1 Bodcaw, 29-19s-23w, Lafayette County, drilling in lower Glen Rose at 5,925 ft. Carter Oil Co. 1 Pepper, 15-19s-15w, Union County, drilling in Cotton Valley at 7,562 ft. Cuttings from 7,540-55 ft. showed ether cut and fluorescence but two drill-stem tests of the interval failed.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Union County: Newton Oil Co. 1 D. G. Nale, NE NW NW 30-23n-1e, perforated 2,208-14 ft., Nacatoch, flowed 97 bbl. 35.6°-gravity oil and 146 bbl. salt water a day through ¼-in. choke, flowing tubing pressure 130 psi., casing pressure 200 psi., TD 2,246 ft.

NORTH LOUISIANA WILDCAT FAILURES

Caddo Parish: Chicago Corp. 1 Ledbetter, NE SE SW 4-22n-15w, dry, TD 5,805 ft., perf. 5,716-24 ft., pumped 3 bbl. oil and 20 bbl. salt water a day, elev. 234 ft.

East Carroll Parish: Union Producing Co. 3 J. A. O'Brien, NW NE 31-20n-11e, dry, TD 2,401 ft.

Franklin Parish: Primes Oil Co. 1 P. P. Ferguson, SE NW NW 18-15n-8e, dry, TD 4,553 ft., Sparta 643 ft., Wilcox 1,574 ft., gas rock 3,233 ft., Paluxy 4,154 ft., elev. 85 ft.

Natchitoches Parish: Continental Oil Co. A-1 Pardee, SE NE 30-12n-6w, dry, TD 11,687 ft.

Union Parish: Carl Holloway Co. 1 Grady Black, SW NW NE 35-23n-1w, dry, TD 2,297 ft., Nacatoch 2,123 ft., second Nacatoch 2,164 ft., Saratoga 2,280 ft., elev. 146 ft.

ARKANSAS WILDCAT FAILURES

Clark County: Lee & Burnett A-1 Sid Williams, NW SW 6-9s-20w, dry, TD 1,615 ft.

Nevada County: Sohio Petroleum Co. 1 C. O. Hodge, NE NE NE 13-14s-20w, dry, TD 3,462 ft., Nacatoch 1,850 ft., Saratoga 2,135 ft., base Annona 2,425 ft., fault 2,800 ft., lost 475 ft., Travis Peak 2,830 ft., elev. 299 ft.

St. Francis County: Barnwell Drilling Co. 1 Tombaugh, NW NE NE 8-4n-1w, dry, TD 2,671 ft.

Union County: Sohio Petroleum Co. 1 M. A. Schilling, SE SW 12-16s-17w, dry, TD 6,193 ft., PB 2,332 ft., perf. 2,309-12 ft., reperf. 2,308-12 ft., swabbed estimated 10 bbl. oil plus 500 bbl. salt water, was not abandoned.

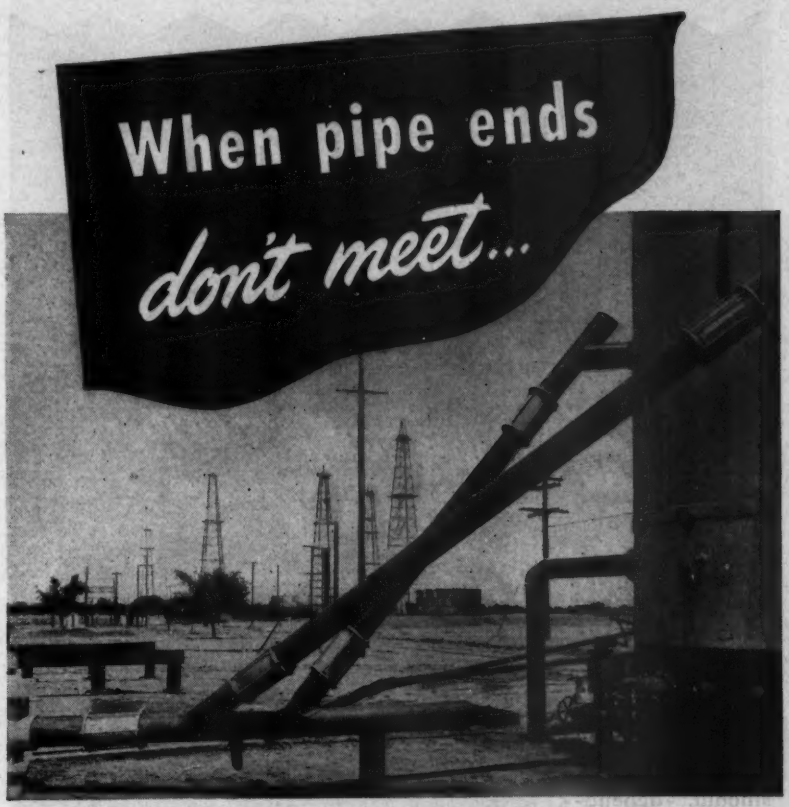
CALIFORNIA

New Gas Field Sought North of San Francisco

LOS ANGELES.—Universal Consolidated Oil Co. shortly will undertake a new exploration program in an effort to uncover a new gas field in Colusa County, about 100 miles north of San Francisco. The company has obtained a 4,500-acre block of leases in the area from Pacific National Oil Corp. and is expected to start drilling operations immediately. Pacific National formerly drilled one well, the 1 Sites, on this property and reportedly encountered good gas shows. The well, however, produced water and gas on a production test and was shut in. Universal has not yet decided whether to reenter the 1 Sites and redrill or start a new well on the property. The 1 Sites reached a depth of approximately 1,400 ft.

Sunray Oil Corp. has added several acres to the productive area of the Four Deer field of Santa Barbara County with completion of its outpost test, the 1 Dominion 23-9n-33w. Bottomed at 6,275 ft., the well yielded 276 bbl. of 13°-gravity oil on a 13-hour production test. The crude is coming from a fractured chert formation, one of four producing formations in the field.

First National Finance Corp. has successfully completed its second wildcat in the Edison area of Kern County, the 2 DeMille-First National-Jeppi, 17-30s-29e. On initial production tests, the well flowed 372 bbl. of oil daily through a 20/64-in. choke. Gravity was tested at 22.0°, and water cut was 0.5 per cent. Total depth of the well is 3,586 ft. with 7-in. casing cemented at 3,328 ft. Due to the results of



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this well, the company probably will redrill the 1 Jeppi, which was completed as a small oil well but subsequently went to water.

Mercury Oil Co.'s new discovery in the Chino Hills area of San Bernardino County, the 1 Well, 32-2s-8w, underwent production tests last week, and on a 50-minute test produced oil at the rate of 75 bbl. daily. Gravity was 22.5° and mud cut was 2 per cent. Flow was through a 28/64-in. choke. The oil was accompanied by a gas flow estimated at 2,000,000 cu. ft. daily. Operators currently plan to run tester with a packer in an efort to locate the point of gas entry. Total depth of the well is 1,273 ft. with shut-off at 1,176 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Arvin area: British-American and Capital Co. 58-A Kovacevich, 26-31s-29e, flowed 125 bbl. in 22 hours, 16/64-in. choke, 4.0 per cent cut, elev. 432 ft., TD 7,440 ft.

Edison area: First National Finance Corp. 2 DeMille-First National-Jeppi, 17-30s-29e, flowed 241 bbl. in 16 hours, 20/64-in. choke, 22.0°-gravity, water cut 1.0 per cent, elev. 497 ft., TD 3,586 ft.

Wheeler Ridge area: Richfield Oil Corp. 82-29 Coal Canyon, 29-11n-20w, pumped 52 bbl. daily, gravity 23.6°, water cut 1.0 per cent, elev. 1,450 ft., TD 1,264 ft.

Los Angeles County, Athens area: Shell Oil Co., Inc., 3 Union-Poindexter, 12-3s-14w, pumped 101 bbl. in 11 hours, water cut 71.0 per cent, elev. 199 ft., TD 9,070 ft.

Elsmere area: Crawford & Hiles 1 Newhall, 31-4n-15w, pumped 15 bbl. daily, gravity 8.8°, water cut 4.8 per cent, elev. 1,215 ft., TD 946 ft.

Pico Canyon area: Standard Oil Co. of California 101 C.S.O. fee, 2-3n-17w, pumped 14 bbl. daily, water cut 32.0 per cent, elev. 1,996 ft., TD 2,068 ft.

Monterey County, San Ardo area: The Texas Co. 3 Lombardi, 27-22s-10e, pumped 4 bbl. daily, elev. 503 ft., TD 2,110 ft.

Sonoma County, Petaluma area: Trico Oil & Gas Co. 3 Petaluma Comm. 5, 30-5n-6w, IP 1,000,000 cu. ft. gas, perf. 1,160-85 ft., elev. 225 ft., TD 1,206 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Kern Bluff area: Petrolia Corp. 1 Morgan, 18-29s-29e, dry in poor oil sand, elev. 818 ft., TD 1,609 ft.

San Diego County, Oceanside area: Charles F. Holmes 1 Holmes, 31-11s-4w, dry, elev. unknown, TD 2,248 ft.

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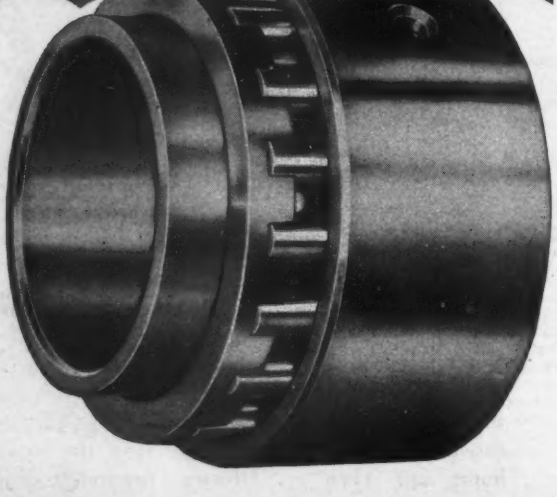

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KANSAS

Rooks County Adds Another Lansing-Kansas City Pool

W. L. HARTMAN has good prospects for Lansing-Kansas City production at 1 Westhusin, SW SW SW 31-9s-17w, Rooks County. Hole was drilled to the Simpson with Lansing called at 3,304 ft. Conglomerate at 3,547 ft., and erosional Simpson at 3,593 ft. Tests of the lower levels did not indicate commercial production so the well was plugged back to 3,484 ft. and perforated at 3,477-83 ft. resulting in a fillup of 345 ft. of fluid, made up of 245 ft. of high-gravity oil and water.

Russell County has new Arbuckle production in the area north of Ney pool and between Forrest Hill and Trapp pools at 1 Meier, SE SE NW 30-15s-12w. The Arbuckle was topped at 3,325 ft. and hole was carried to 3,331 ft. Well swabbed 13 bbl. per hour and will go on pump.

In Stafford County, Delta Production Co. and B. & R. Drilling Co. have run casing at 1 Hildebrand, NW NW SE 2-24s-12w, about 1¼ miles north of Stafford pool. The Viola was topped at 3,771 ft. and a drill-stem test had a good flow of gas. The Simpson was logged at 3,904 ft. and Arbuckle at 3,955 ft. Total depth is 3,985 ft. with casing set to the bottom.

Atlantic Refining Co. is testing a show of oil in the Arbuckle at 1 McDonald, NE SW SW 11-21s-13w, about ½ mile east of Rothgarn pool in northern Stafford County. Casing has been set to 3,520 ft. at top of the Arbuckle and hole was drilled to 3,532 ft.

For the week, a total of 57 new locations were recorded. Rice County led with eight, followed by Barton and Russell counties with six each, and by Butler and Rooks counties with five each.

KANSAS SUCCESSFUL WILDCATS

Rooks County: Westgate-Greenland Oil Co. 1 McClelland, NW NW NE 4-9s-19w, produced 314 bbl. of 23-gravity oil per day from Arbuckle at 3,442-44 ft., TD 3,444 ft.

Bay Petroleum Co. 1 Hunter, SW SW SW 4-8s-17w, pumped 80 bbl. oil per day from Arbuckle at 3,383-99 ft.; Topeka 2,853 ft., Heebner 3,059 ft., Lansing 3,101 ft., TD 3,399 ft.

KANSAS WILDCAT FAILURES

Butler County: Dunn & Strait 1 Cooley, NW NE NE 35-29s-4e, dry, TD 3,291 ft., Kansas City 2,230 ft., Bartlesville 2,759 ft., Mississippian 2,840 ft., Arbuckle 3,283 ft.

Chase County: Jackman & Jackman, SE SE NE 13-18s-9e, dry, TD 3,340 ft., Mississippian 2,469 ft., basal Mississippian 2,740 ft., Arbuckle 3,150 ft.

Decatur County: H. L. Hunt 1 Petracek, C NE NE 14-4s-27w, dry, TD 4,020 ft., anhydrite 2,150 ft., Topeka 3,265 ft., Heebner 3,442 ft., Lansing 3,471 ft., conglomerate 3,926 ft., Arbuckle 3,926 ft.

Dickinson County: Keyes Drilling Co. 1 Brockmeier, SW SE NE 9-16s-4e, dry, TD 2,380 ft., Mississippian 2,283 ft., basal Mississippian 2,740 ft., Arbuckle 3,150 ft.

Ellis County: Texas Co. 1 Chapman, NW NW SW 15-12s-20w, dry, TD 4,160 ft., Heebner 3,584 ft. with slight show of oil, Lansing 3,636 ft. with slight show of oil, Arbuckle 4,092 ft.

Herndon Drilling Co. 1 Scheck, SW SW SE 9-13s-16w, dry, TD 3,560 ft., anhydrite 1,095 ft., Heebner 3,149 ft., Lansing 3,181 ft., slight show of oil 3,205-22 ft., conglomerate 3,462 ft., Arbuckle 3,543 ft.

McPherson County: Westgate - Greenland Oil Co. 1 Crowther, NE NE NW 1-18s-1w, dry, TD 2,843 ft., Lansing 2,210 ft., Mississippian 2,777 ft.

Phillips County: Flynn Oil Co. 1 Willis, NE NE NE 8-4s-16w, dry, TD 3,874 ft., Topeka 2,830 ft., Heebner 3,047 ft., Dodge 3,075 ft., Lansing 3,094 ft., basal Kansas City 3,352 ft., conglomerate 3,611 ft., Viola 3,645 ft., Simpson 3,806 ft., Arbuckle 3,848 ft.

Reno County: H. L. Hunt 1 Woodson, NE NE SE 28-26s-9w, dry, TD 4,400 ft., Topeka 2,810 ft., Lansing 3,377 ft., slight show of oil 3,390-95 ft. and 3,440-50 ft., Mississippian 3,932 ft., Viola 4,170 ft., Simpson 4,254 ft., Simpson shale 4,258 ft., Arbuckle 4,347 ft.

Rooks County: W. L. Hartman 1 Davey, SW SW NW 11-8s-19w, dry, TD 3,524 ft., Topeka 2,910 ft., Heebner 3,097 ft., Lansing 3,124 ft., basal Kansas City 3,360 ft., conglomerate 3,426 ft., Arbuckle 3,471 ft., no shows.

Birmingham-Bartlett 1 Bice, NE NW SW 15-10s-17w, dry, TD 3,721 ft., Heebner 3,524 ft., Lansing 3,291 ft., conglomerate 3,579 ft., Viola 3,631 ft., Simpson 3,642 ft., Arbuckle 3,671 ft.

CANADIAN FIELDS

Wild Leduc Well May Be Under Control Soon

CHATHAM, Ont.—With two directionally drilled relief wells in Leduc field nearing the point where they will tap Atlantic 3 wild well in the D-3 zone, it is anticipated that the well will be brought under control by the end of July.

Imperial 80, LSD 16, 26-50-26w4, in the north-central section of the Leduc field, has apparently established commercial production in the Lower Cretaceous. A 1-hour drill-stem test at 3,409-16 ft. gave gas at 1,565,000 cu. ft. daily, and on deepening to 4,457 ft. the formation gave 1,170 ft. oil rise and later 4,000,000 cu. ft. gas.

Calmont-Leduc 1, LSD 5-51-25w4, outpost well north and west of the proven field, got the D-2 zone at 4,895 ft. with drill-stem test showing salt water. It is coring in green shale below 5,267 ft. in search of the D-3 zone.

East of the Woodbend extension, Continental-Leduc 3, LSD 12, 7-51-25w4, is below 5,200 ft. after getting 250 ft. rise of sulfur water in the D-2 zone. Farther west, Imperial-Woodbend 4, LSD 1, 16-51-26w4, on test at 4,970 ft. showed 450 ft. oil-cut mud.

Northern Alberta.—North of Edmonton, Imperial-Volmer 1, LSD 2, 16-55-25w4, finished at 7,272 ft., has plugged back to swab and test upper horizons where oil shows were indicated. Imperial is starting two other northern tests, Imperial-Redwater 1, LSD 1, 32-57-214w, about 30 miles northeast of Edmonton; and Imperial-Ardrossan 1, LSD 8, 17-53-21w4, about 18 miles due east of Edmonton. These wells are part of the systematic testing of the northern plains area for Devonian production similar to Leduc field.

Brooks.—Good indications of production from the lower Cretaceous have been encountered in Brooks-Province 36-14, LSD 10, 14-19-14w4, in the Brooks area of southern Alberta. Following a rise of 27° gravity A.P.I. crude the well was cemented at 3,348 ft. and casing will be run and perforated for a production test.

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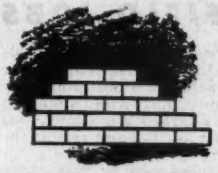

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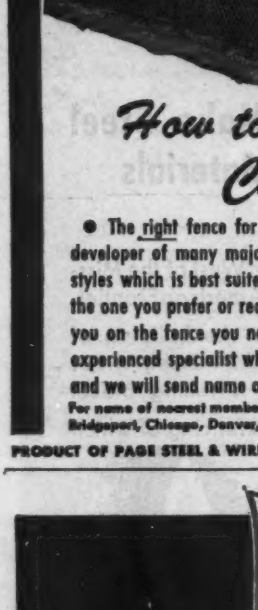

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Bata-Superior, drilling an exploratory test at Compeer, 80 miles south of Lloydminster field, has halted drilling at 2,625 ft. to test shows encountered in the lower Cretaceous.

OKLAHOMA

Garvin County Wildcat Gets Deese Production

GARVIN County seems to have a new area that will produce from the Deese sand with the released results of testing at C. L. Carlock 1 Tuley, NE NE SE 12-1n-1w. The wildcat, located about 1 mile north of Hoover pool and about 5 miles east of Katie pool, had the first Deese sand at 4,510 ft. and a drill-stem test of the zone at 4,510-18 ft. had a flow of oil and mud in 55 minutes. The oil was reported to be about 45° gravity. Operator cored stained sandy lime at 4,518-26 ft. and deepened hole to 4,628 ft. A drill-stem test at 4,610-28 ft. had gas in 90 minutes and recovered 330 ft. of asphaltic oil.

A new Bartlesville sand pool is indicated for Cleveland County with production at E. P. Halliburton 1 Ranch, SW SW NW 4-8n-1e, about 12 miles southeast of Norman. Bartlesville sand was topped at 5,772 ft. and a drill-stem test at 5,782-5,807 ft. with tool open for 1 hour had gas in 22 minutes and recovered 60 ft. of oil and 360 ft. of oil-cut mud. Hole was deepened to 5,843 ft. and a test at 5,780-5,843 ft. recovered 540 ft. of oil-cut mud.

One of the better oil wells of the week was Phillips Petroleum Co. 1 Hutson, SE SW SW 31-4n-5w, at the north end of Knox pool in Grady County. The well flowed 243 bbl. in 3¾ hours after a shot in the Springer sand at 5,697-5,729 ft. It was shut in for storage but later flowed 115 bbl. in 1½ hours.

Okfuskee County has a new Wilcox sand pool with production at T. E. Berry and Ralph Fillmore 1 Deaner, SW SE SW 15-12n-11e. The Wilcox was topped at 3,474 ft. and when plug was drilled to a total depth of 3,488 ft. the well flowed 315 bbl. in 20 hours through casing.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Carter Oil Co. 1 Hall-Newey, C NE SW 9-4n-3w, flowed 60 bbl. of 43.6°-gravity oil per day from Gibson sand at 6,935-80 ft., through ¾-in. tubing choke, TD 7,157 ft.

Oklahoma County: Peppers 1 Slaughter, NW NE SW 6-12n-2w, pumped 183 bbl. of oil per day from unconformity and Bois d'Arc at 6,288-6,336 ft., TD 6,615 ft.

Payne County: Republic 1 Lovell Bros. Trust, SW SW NW 35-18n-3e, flowed 10 bbl. of oil per day from Bartlesville at 3,939-45 ft., through ¾-in. tubing choke, TD 3,950 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Russell 1 Bull, NW NW SW 21-2s-10w, dry, TD 2,362 ft., hard lime and chert 2,170-76 ft., sand 2,354-62 ft.

Lincoln County: Palmer 1 Hublitz, SE SE NE 31-14n-5e, dry, TD 3,625 ft., Hogshooter 2,432 ft., Layton 2,482 ft., Checkerboard 2,777 ft., conglomerate 2,795 ft., Oswego 3,560 ft., Prue 3,598 ft., sand 3,617 ft.

Great Lakes 1 State, NE SE SE 36-15n-2e, dry, TD 4,730 ft., Hogshooter 3,242 ft., Layton 3,288 ft., Checkerboard 3,563 ft., conglomerate 3,577 ft., Oswego 4,130 ft., Prue 4,161 ft., Skinner 4,404 ft., Red Fork 4,458 ft., Mississippi lime 4,718 ft.

Logan County: Double R 1 Smulian, SE SE SW 25-15n-1w, dry, TD 5,845 ft., Pawhuska 2,331 ft., Avant 3,662 ft., Hogshooter 4,241 ft., Layton 4,292 ft., Checkerboard 4,524 ft., Oswego 4,999 ft. Bartlesville 5,411 ft., Hunton 5,478 ft., Sylvan 5,513 ft. Viola 5,617 ft., Wilcox 5,728 ft., second Wilcox 5,840 ft.

Osage County: Oliphant 1 (Osage), NE SW NW 13-25n-4e, dry, TD 3,376 ft., Layton

2,264-84 ft., Big lime 2,418 ft., Oswego 2,944-3,024 ft., Mississippi chat 3,290 ft., sandy lime 3,373 ft., Mississippi lime 3,375 ft.

Pawnee County: Ackley 1 Rosier, SE SE NE 28-20n-5e, dry, TD 3,804 ft., Avant 1,966 ft., Osage Layton 2,058 ft., Hogshooter 2,362 ft., Layton 2,457 ft., Checkerboard 2,680 ft., conglomerate 2,860 ft., Oswego 2,907 ft., Inola 3,330 ft., Bartlesville 3,345 ft., Mississippi lime 3,600 ft., Woodford 3,712 ft., dense 3,752 ft., Wilcox 3,770 ft.

Payne County: Palmer 1 Caldwell, NW NE NW 17n-5e, dry, TD 4,253 ft., Hogshooter 2,465 ft., Layton 2,515-65 ft., Checkerboard 2,763 ft., Big lime 3,235 ft., Oswego 3,265 ft., Prue 3,384 ft., Bartlesville 3,723 ft., Mayes 3,894 ft., Woodford 4,066 ft., Misener 4,105 ft., Sylvan 4,115 ft., Viola 4,148 ft., Wilcox 4,197 ft., second Wilcox 4,234 ft.

Stephens County: Stanolind 1 Davis, SE SE NW 14-1n-6w, dry, TD 9,364 ft.

Sinclair 1 City of Duncan, SW SW SW 26-1n-6w, dry, TD 6,500 ft., Hoxbar 4,155-6,503 ft., no shows.

Tillman County: McCasland 1 Williamson, W/2 SE NW SE 1-3s-17w, dry, TD 3,500 ft., Cisco 2,800 ft., lime 3,213-33 ft. and 3,260-78 ft., Canyon 3,323-3,402 ft., no shows.

ROCKY MOUNTAIN

Lodgepole Test Swabs 15 Bbl. Per Hour

DENVER.—After swabbing at the rate of 15 bbl. of oil per hour from the Dakota formation, Bay Petroleum Corp. is now moving in heavier equipment to place its wildcat in the Lodgepole area, Weston County, Wyoming, on production. The test is 1 Christensen-Davis, NW SE 9-44n-66w, 15 miles west of the Mush Creek field. The well found oil on drill-stem test of the Dakota at 6,730-38 ft. 3 weeks ago and completion tests after running 7-in. casing to 6,730 ft. have been delayed until storage tanks were erected.

Discovery of oil in this test caused an extensive leasing play on the east side of the Powder River Basin, with prices reported as high as $80.00 per acre. The 15 bbl. per hour swabbing rate was through tubing with fluid level at around 2,200 ft. from the surface. Tubing will be pulled and swabbing continued through the casing in an attempt to clear the well of mud and sludge. Bay is now drilling below 4,250 ft. at 1 Goodson-Smith, NE SE 14-44n-66w, southeast of the discovery. The latter well is reported running approximately 14 ft. higher structurally than the discovery test, but definite correlation is difficult until upper Cretaceous sands are reached.

A new gas discovery has been made in east-central Utah near the Colorado-Utah state line, at Stanolind Oil & Gas Co. and Frontier Refining Co.'s 1 Crittenden, SE SE 12-17s-25e, on the Bar-X structure, Grand County, Utah. The well tested at the rate of approximately 7,000,000 cu. ft. of gas from the Morrison below 2,996 ft. On a drill-stem test at 3,557-3,605 ft., the well made 4,700,000 cu. ft. of gas with flowing pressure 800 psi. and shut-in pressure 1,300 psi. This is the first well to be drilled on this structure, and is a farmout from Frontier to Stanolind, with Frontier retaining an interest in the entire block.

Saturation was reported by General Petroleum Corp. at its wildcat in the North Sand Creek area at 65-2-G, NE NW SE 2-46n-91w, Washakie County, Wyoming. The well is reported coring below 9,700 ft. with top of the Tensleep logged at 9,662 ft. This well is 3½ miles north of the Sand Creek (Frontier sand) producing field and is believed to be on a separate high. The well had water in the Frontier, but 10 days ago cored saturated lime in the Phosphoria section. This zone tested gas and mud on drill-stem but looks encouraging for oil production following acidizing. General Petroleum's deep test in the Sand Creek field proper at 43-26-G, NE SE NW 26-46n-91w, topped the Madison at 9,949 ft. and at 10,002 ft. had no shows of oil or gas in that zone. The well will probably be plugged back for completion as a producer in the Frontier formation.

Shows of oil have been logged by Stanolind Oil & Gas Co. on its interesting wildcat at 1 Unit, SE NE 8-55n-100w, Big Sand Coulee area, Park County, Wyoming. The operator is now drilling below 10,174 ft. in the Frontier formation, with top of the Frontier reported at 10,002 ft. On drill-stem test 10,028-10,090 ft. the well made 92 ft. of slightly oil-cut mud in 15 minutes. This well is located south of the Silver Tip area, where Seaboard Oil Co. recently made oil discoveries in the Frontier and Embar formations.

New locations.—Twenty-seven new locations were made, with 12 in Wyoming, 8 in Montana, 4 in Colorado and 3 in Northern New Mexico. Several new wildcats are scheduled for each of the states, including two interesting ones in Wyoming. These are Amerada and Sohio's Shirley Basin prospect in the NW SE SE 17-26n-80w, Carbon County, and Superior's Horse Center test at 1 Unit, NW NE 31-52n-101w, Park County. The Shirley Basin well will be to Madison at around 2,500 ft. Superior's Horse Center well will be drilled to granite at around 4,000 ft.

In Montana, Amerada and General Petroleum have made location and are waiting on contractor for a test on the Melstone block at 1 Hougen, SE SE 23-10n-29e, Musselshell County. This well is located southeast of the Ragged Point field, where Texas made a discovery early this year, and will be drilled to Kibbey sand at approximately 4,200 ft. A wildcat of interest in the southeast section of the state will be Hunt Oil Co. 1 Government, NE NE 20-8s-57e, Carter County, on the Wolf Creek structure. The well will be a Muddy sand test.

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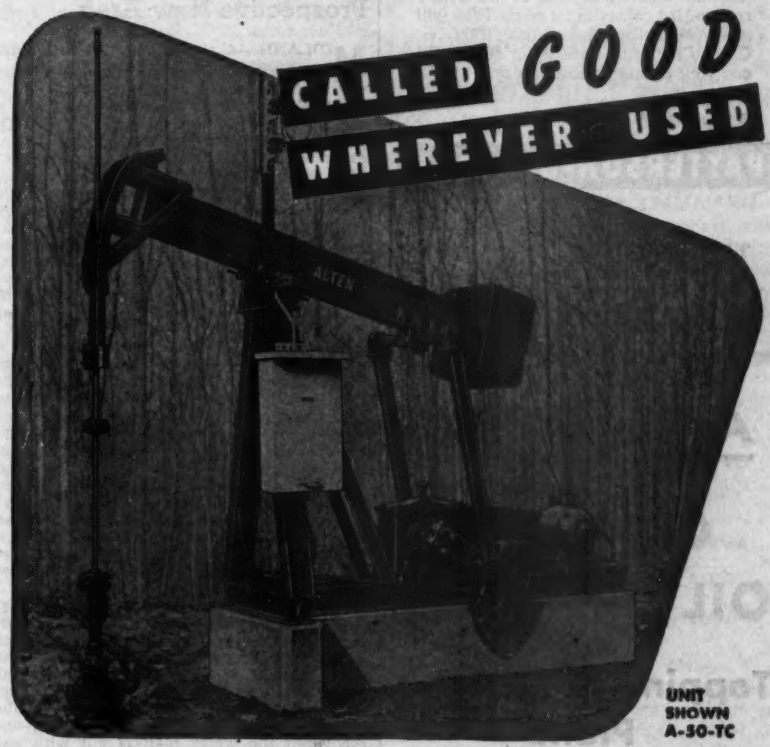

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In northern New Mexico, Skelly has made location for a test at 1 Federal-Carey, SE NW 36-24n-1e, Rio Arriba County, for a Pennsylvanian test. Humble is drilling below 700 ft. on its wildcat at 1 Navajo, NE NW 27-20n-20w, in the Todilto Park area, McKinley County.

WILDCAT FAILURES IN COLORADO

Boone Dome, Archuleta County: Yeakley Oil Co. 1 Shahan, NE SE 7-31n-2e, 2,575 TD, abnd., Mancos shale 1,205, 7-in. csg. 2,140.

Kannah Creek, Mesa County, Joe Dinger 1 fee, SW SW SW 35-2s-2e, 3,241 TD, abnd., Dakota 925, Morrison 1,047, 7-in. csg. 2,214

Wolf Creek, Moffat County, Empire State Petroleum 1 Ramsey, SW NW 27-4n-100w 3,001 TD, suspended indefinitely, Weber 1,838, water 1,867.

PERMIAN BASIN

Magnolia May Confirm Prospective New Area

MIDLAND.—A second Pennsylvanian discovery was in prospect for southwestern Scurry County at Magnolia Petroleum Co. 1 Winston Bros., 3½ miles southwest of Snyder and 3½ miles northeast of Sun Oil Co.'s 1 Emil Schattel, Canyon lime discovery now shut in to build storage. Magnolia's well is said to be running approximately 18 ft. high on the Canyon lime, but the two are showing for production from the same strata, both have an unusually thick pay section, and Sun officials believe the two wells will open a large area. Last week Sun's well made a 149-bbl. flow of oil in 7 hours, natural, from open hole pay at 6,868-91 ft., with part of the pay section cut off by 7-in. casing set to 6,858 ft.

Magnolia 1 Winston had total depth at 6,830 ft. on last report and was coring ahead to determine extent of the pay. A drill-stem test between 6,823-30 ft., using ⅝-in. choke and open 2 hours, brought gas to the surface in 14 minutes, estimated at 400,000 cu. ft. daily, and recovered 1,300 ft. of oil, plus some salt water. An earlier test from 6,790-6,810 ft., using a 1,500-ft. water blanket, recovered 10 ft. of free oil, 1,500 ft. of oil-cut water blanket and 180 ft. of oil and gas-cut mud. Operators then set packer at 6,795 ft. and recovered 20 ft. of slightly gas-cut mud, with no water, on a 1-hour test to 6,810 ft.

In Upton County, D. D. Feldman 1 Max Pray-State has been given up as a failure in the Ellenburger and will be plugged back to test the Fusselman section of the Silurian, from 11,134-11,209 ft. The last test of the Ellenburger through casing perforations from 11,530-11,610 ft. produced approximately 10,000 cu. ft. of gas, in 2½ hours, and recovered the water blanket cut with gas, with no shows of oil.

Three miles west of the Benedum field, Humble Oil & Refining Co. 1-A Rosa Barnett placed the Ellenburger top at 11,650 ft., making it 595 ft. lower structurally than the Benedum well. Operators were preparing to run a drill-stem test to 11,670 ft., total depth. Humble 1-B Barnett, Section 39, Block Y, 1 mile northeast of D. D. Feldman 1 Pray-State, was drilling below 5,151 ft.

Republic Natural Gas Co. 1-E-A Barnett, 2 miles north of the Benedum well, reported only a small amount of gas on a drill-stem test from 10,546-10,635 ft., in the Devonian, and was drilling below 11,686 ft. Plymouth Oil Co. 1 Taylor & Sadler, southeast offset to the discovery, was drilling below 10,336 ft. in the Devonian.

In northwestern Coke County, Hickok & Reynolds, Inc., et al, 1 E. C. Rawlings, 1½ miles west of the town of Bronte, reported small shows of oil in the Palo Pinto. Casing was perforated at 4,370-90 ft. and it was said to be swabbing about 50 per cent oil, but the amount of fluid swabbed was not reported. This test missed the Ellenburger in drilling to 5,802 ft., going from the Pennsylvanian into pre-Cambrian at 5,640 ft., or minus 3,809 ft. It showed for an estimated 10,000,000 to 15,000,000 cu. ft. of gas a day in the Marble Falls limestone, plus some distillate, at 5,118-88 ft. If the Palo Pinto proves unproductive, further tests are to be made in the Marble Falls.

An eastern outpost on the south end of the Jameson field, Section 522, Homann Survey, A. G. Hill 1 Ralph H. Harris Estate, topped the Ellenburger at 7,020 ft., or minus 5,030 ft., which checked some 50 ft. higher than Sun Oil Co. 1 Central National Bank, 1½ miles to the west, which ran about normal to the field. Samples in the 1 Harris showed light scattered staining to 7,043 ft., and operators were to drill-stem test to that depth. The well has shown for possible production in the Strawn which was tested between 5,808-28 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Andrews County: Phillips Petroleum Co. 1-T Texas-University, Sec. 36, Blk. 13, University Lands, 1 mi. S Shafter Lake Devonian field, pumped 26 bbl. of 34°-gravity oil and 7 bbl. of water in 24 hr., perforated casing 6,910-50 ft. in Tubb zone, TD 11,000 ft., PB 6,956 ft.

Coke County: Alan Guiberson 1 Jack Lassiter, Sec. 308, Blk. 1-A, H&TC Sur., 3 mi. NW Sanco, flowed 222 bbl. of 46.7°-gravity oil a day, 23/64-in. choke, GOR 5,000 cu. ft., tubing pressure 150 psi., casing pressure 1,100 psi., well died after the 24-hr. test, then flowed, by heads, 110 bbl. of oil cutting 30 per cent salt water, Marble Falls 6,464 ft., top pay 6,510 ft., TD 6,528 ft., PB 6,517 ft.

Crane County: George F. Getty 1 Mollie Day, Sec. 3, Blk. X, CCSD&RGNG Sur., 2½ mi. S Crane, pumped 72 bbl. of 30.6°-gravity oil a day, shot sand 2,809-2,920 ft., TD 3,179 ft., PB 2,820 ft., elev. 2,618 ft.

Reeves County: Ford Chapman 1 Standard Oil Co. of Texas, Sec. 46, Blk. 57, T&P Sur., 3½ mi. SW Orla, shot Delaware sand 2,895-2,906 ft., pumped 107 bbl. of 42°-gravity oil in 12 hr., TD 2,906 ft., pay 2,900 ft., elev. 2,948 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Cochran County: R. B. Farris 1 J. K. Griffith, Sec. 2, Blk. U, PSL Sur., 9 mi. N Bledsoe, dry, TD 5,012 ft., San Andres 3,430 ft., elev. 3,947 ft.

Floyd County: H. E. Chiles, Jr., 1 F. C. Strickler, Sec. 19, Blk. K, on W line of county, up 1½ mi. from S line, dry, TD 7,757 ft., no tops reported.

Garza County: A. R. McElreath & T. B. Dean 1 Sol Davis, Sec. 80, Blk. 5, GH&H Sur., 12 mi. E Post, dry, TD 2,878 ft.

Loving County: Louis Crouch 1 Young Bell, Sec. 42, Blk. 55, T&P Sur., 15 mi. NW Mentone, dry, TD 3,822 ft., Delaware sand 3,510 ft., elev. 2,735 ft.

Mitchell County: Sun Oil Co. 1 Ellwood, Sec. 26, Blk. 16, SPRR Sur., 17½ mi. S

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Colorado City, dry, TD 7,817 ft., San Angelo 1,655 ft., Tubb 2,670 ft., Pennsylvanian 7,280 ft., Branett shale 7,345 ft., Chappell 7,434 ft., Ellenburger 7,660 ft., elev. 2,168 ft.

Reeves County: Argo Oil Corp. 1 Clyde Ikins, Sec. 293, Blk. 13, H&GN Sur., 8 mi. NE Saragosa, dry, TD 11,250 ft., Delaware lime 5,164 ft., Delaware sand 5,223 ft., Leonard sand 7,840 ft., Wolfcamp 9,820 ft., elev. 2,930 ft.

Taylor Refining Co. 1 Grisham-Hunter 4, Sec. 25, Blk. 55, PSL Sur., 15 mi. NW Toyah, dry, TD 300 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Richfield Oil Corp. 2 Comanche Unit, Chaves County wildcat in 24-11s-26e, was waiting on orders after recovering salt water in the Silurian, total depth 6,330 ft. A drill-stem test from 6,246-6,330 ft., open 2 hours and 30 minutes, recovered 700 ft. of slightly gas-cut drilling mud and 150 ft. of muddy salt water. Perforations made from 6,116-42 ft. were washed with mud acid and a 350-bbl. oil load was made, after which it swabbed an estimated 25 bbl. of fluid per day, based on a 7-hour test, being 95 per cent salt water. After shut in 7 hours, it swabbed at the rate of 15 bbl. of fluid daily, of about the same percentage.

Six miles south of the 2 Comanche Unit, Humble Oil & Refining Co. 1 State, 10-12s-27e, was drilling below 6,250 ft. in limestone, and said to be running only slightly lower than the Comanche well. Previously

(Continued on page 155)

ILLINOIS

Wabash County Outpost Has Good Oil Show

MATTOON.—Continental Oil Co. 1 Clara Schrodt, SW NE SE 26-1s-13w, Wabash County, had shows of oil in both Cypress and Rosiclare. A drill-stem test of the Cypress at 2,337-58 ft. with tool open for 1 hour recovered 110 ft. of oil, 180 ft. of oil-cut mud, and 60 ft. of slightly oil-cut mud. A 1-hour drill-stem test of he Rosiclare at 2,679-90 ft. had gas in 45 minutes and recovered 660 ft. of oil, 240 ft. of mud-cut oil, and 90 ft. of oil-cut mud. Casing has been run to 2,729 ft. for further tests. Well is northeast of Maud pool.

In Jefferson County, A. J. Slagter, Jr., 1 Modert, NW SW SE 22-3s-3e, recovered 360 ft. of gas, 240 ft. of oil, 60 ft. of mud-cut oil, and 330 ft. of salt water on a drill-stem test of the Aux Vases at 2,750-78 ft. Casing has been set through the Aux Vases. Total depth is 2,865 ft.

In Franklin County, Paul Mosebach has completed 1 Eurgil, SW SE SE 35-5s-1e, with an initial production of 50 bbl. from the Aux Vases at 2,586-2,637 ft. after a shot of 100 qt. The well also had a show of oil in the O'Hara at 2,764-68 ft.

ILLINOIS SUCCESSFUL WILDCATS

Wayne County: National Associated Oil Co. 1 S. G. Feller, SW½ NE SW 16-1n-7e, IP 42 bbl., Aux Vases, 3,047-58 ft., TD 3,250 ft.

Franklin County: Paul Mosebach 1 Eurgil, SW SE SE 35-5s-1e, IP 50 bbl., Aux Vases, 2,586-2,637 ft., TD 2,768 ft.

White County: National Associated Oil Co. 1 Garrison, NW NE NE 24-6s-9e, IP 56 bbl., Aux Vases, 2,900-08 ft., TD 2,910 ft.

ILLINOIS WILDCAT FAILURES

Jasper County: A. J. Foster 1 M. Bailey, SW NW NW 9-7n-14w, dry, TD 2,293 ft.

J. J. Lynn 1 H. F. Newkirk, SW NW SE 10-7n-10e, dry, TD 2,714 ft.

Madison County: T. R. Kerwin 1 Mann, SW SE NW 16-3n-8w, dry, TD 2,032 ft.

Clinton County: W. R. Kuykendall, 1 W. Michael, NE NW SW 32-2n-1w, dry, TD 1,528 ft.

Jefferson County: Central Pipe Line 1 M.

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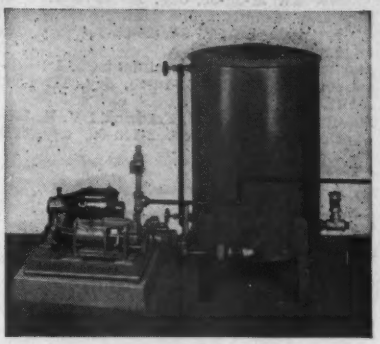

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Renkel, NW SW NW 19-4s-4e, dry, TD 3,193 ft.

T. B. Derrickson 1 Rawden, NE NE SE 17-1s-3e, dry, TD 2,764 ft.

Franklin County: Dunbar Drilling Co. 1 B. Hannegan, NE NW NE 18-7s-4e, dry, TD 3,206 ft.

Clay County: Don Baines 1 J. Mason, SW NW SW 21-3n-5e, dry, TD 1,713 ft.

Richland County: Joe Linzy 1 W. E. Fritschle, SE SW SW 26-3n-10e, dry, TD 3,238 ft.

Marion County: Oil Investment Co. 1 Addison, NE SW SE 31-1n-1e, dry, TD 1,883 ft.

Moultrie County: F. E. Fredrick 1 V. H. McDonald, NE SE SE 2-14n-6e, dry, TD 2,001 ft.

OHIO, KENTUCKY

Morgan County Wildcat Shows Good Gas Pay

COLUMBUS.—Wittmer Co.'s wildcat on Wm. O. Wortman, Section 24, Bristol Township, Morgan County, was drilled to a depth of 4,900 ft. with a total volume of 1,040,000 cu. ft. gas. Sand correlation has not yet been completed, but the Upper Clinton or Lower Shell gaged 840,000 cu. ft., and the Lower Clinton the balance. Niagara lime was logged at 3,422-4,590 ft., pay shell at 4,807-20 ft., and Clinton sand at 4,840-79 ft. The discovery is 8 miles east of any Clinton production

Burkhart & Smith struck one of those rich but small and isolated pools occasionally found in southeastern Ohio. The producer, 2 Wm. Miracle, Section 7, Liberty Township, Washington County, topped the Lime sand at 1,280 ft., and finished at 1,284 ft. where it flowed 110 bbl. with an estimated 300,000 cu. ft. gas.

The third of the Parma Township offsets found the Oriskany productive. Harry Demsey 1 Fred Wather, Lot 41, reached the sand at 1,782 ft. with pays at 1,782-1,815 ft. The total volume of 584,000 was shot and shut in after 39 hours at 775,000 cu. ft.

John Morrow et al has started drilling his third semiwildcat in Trimble Township, Athens County. The location is on Republic Coal Co. in Fr. 17.

WESTERN KENTUCKY

OWENSBORO.—A large new area in Webster County has been opened by a good oil show in a wildcat just south of the town of Dixon. The well, F. T. Shelton, Ashland Oil & Refining Co., Kennard Oil Co., and H. L. Cokes 1 Mattie Ramsey, 21-M-22, found excellent oil saturation in the O'Hara at 3,040-47 ft. A 1-hour drill-stem test had gas in 7 minutes and recovered 1,740 ft. of clean oil and 60 ft. of muddy oil with no water. The well also had a show of oil in the Palestine sand at 2,250-70 ft. and a slight show of gas in the Cypress at 2,818-29 ft. The wildcat is about 6 miles northeast of the East Clay pool, the nearest production. Delta Drilling Co. has staked a west offset to the Ramsey well at 1 Mrs. J. F. Hailman, NE SW SW 21-M-22.

In Ohio County, F. H. Rhodes has completed 1 "A" Perene Rice, 3-N-34, with an initial production of 15 bbl. of oil and 10 bbl. of water from Aux Vases lime at 653-58 ft.

EASTERN KENTUCKY

ASHLAND.—The new Furnace fas field, located on the Estill-Powell County line in Carter coordinates P-68, is the most active area in exploration for deeper oil and gas possibilities in eastern Kentucky. To date four gas wells have been completed, all producing from the St. Peter (Ordovician) sand, at an average depth of 2,575 ft. No market has been developed for this gas as yet.

Three miles northeast of the Furnace field, Sam Allen et al have a failure at their 1 C. A. Means in 6-P-69. This test has been abandoned after getting water in the Knox dolomite at 2,195-2,205 ft., total depth.

The important wildcat of Dyer, Patterson and Roeder in Jackson County, 25-L-66, on the N. V. Bond tract, is drilling below 4,200 ft. in the Knox dolomite, topped at 2,920 ft. Shows of gas are reported.

EASTERN KENTUCKY WILDCAT FAILURES

Powell County: Sam Allen et al 1 C. A. Means, 6-P-69, dry, TD 2,205 ft., St. Peter 2,155 ft., Knox 2,192 ft.

Endicott & Compton 1 George Sele, 3-Q-67, dry, TD 1,707 ft., St. Peter 1,672 ft.; hole full of sulfur water.

INDIANA

EVANSVILLE.—Vanderburgh County has two promising wildcat strikes north of Evansville. In the area about 1 mile northeast of Evansville pool, Maynard Rogers et al 1 Herman Ross, NW SW SW 36-5s-11w, is showing for an O'Hara limestone producer. A 1-hour drill-stem test of the zone at 2,369-74 ft. recovered 1,680 ft. of gas, 660 ft. of oil, and 20 ft. of mud with no water. Production in the Evansville pool is from a Pennsylvania sand at about 1,000 ft.

The other wildcat is about 5 miles northeast of Evansville pool and about 4 miles northwest of Vanderburgh pool. The well, Gilliam Drilling Co. 1 H. Spilker, SE SW NW 12-5s-11w, had gas in 25 minutes and recovered 600 ft. of clean oil, 180 ft. of oil-cut mud, and 60 ft. of salt water on a 1-hour drill-stem test of McClosky lime at 2,455-68 ft. Total depth is 2,491 ft.

In Gibson County, Gilliam Drilling Co. and Carter Oil Co. have completed 1 H. M. Montgomery, SE NE SE 18-3s-11w, with an initial production of 67 bbl. per day from Rosiclare lime at 2,470-78 ft. and 2,782-86 ft. Total depth is 2,690 ft.

INDIANA WILDCAT FAILURE

Miami County: C. E. Skiles 1 R. L. Jenkins, SE SW NW 1-25n-4e, dry, TD 1,000 ft.

N. CENTRAL TEXAS

Cooke County May Get Ellenburger Discovery

WICHITA FALLS.—Cooke County was attracting oil interests last week, with the announcement of a prospective Ellenburger discovery. Atlantic Refining Co. 1 Rivoire, 5½ miles southeast of Marysville, in the SA&MG Survey, had a good show of oil in the Ellenburger in drilling from 3,741-58 ft. Operators then ran a 2½-hour drill-stem test which recovered 345 ft. of oil and 30 ft. of oil-cut drilling mud. Top on the formation has not been picked. It was to set casing before making further tests. Location is on a block of 10,000 acres which Atlantic detailed with seismology before drilling.

Deep Rock Oil Corp. 1 Wright, Block 256, BBB&C Survey, prospective Marble Falls discovery, about 3 miles southwest of Throckmorton, ran electrical survey and set casing to 4,970 ft. Operators plan to test the Caddo limestone also, which had a good showing of oil from 4,356-62 ft. The Marble Falls section, which yielded free oil on a drill-stem test, is from 4,794-4,802 ft. Total depth is 5,233 ft., in the Ellenburger topped at 5,180 ft.

Both north and south offsets to the new northwest Chico extension well are showing for producers. Cities Service Oil Co. 1 Sealy, Section 3, GH&H Survey, A-348, the south offset to Kingwood Oil Co. 1 Garrett, set 7-in. casing at 5,358 ft. and was waiting on cement. A drill-stem test of the conglomerate section from 5,297-5,358 ft. brought gas to the surface in 3 minutes and oil in 17 minutes. When pipe was broken down, the recovery was 650 ft. of clean oil. Length of time the tool was open was not reported. Flowing pressure was 1,500 psi., and shut in pressure 1,800 psi. Cities Service is preparing to drill at its north offset location, which will be the B-1 Manning. Farther north of the 1 Garrett, Kingwood 2 Garrett, in the Egery Survey, was coring conglomerate which had a show of oil.

In Montague County, Continental Oil Co. 1 S. W. Kennedy, Section 27, ETRR Survey, about 2 miles southeast of production in the Lewis Stuart field, had promising shows of oil in the conglomerate. A 70-minute drill-stem test from 6,619-26 ft. recovered 60 ft. of oil and 330 ft. of salt water. Seven-inch casing was set to total depth of 6,543 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCAT

Wilbarger County: National Associated Petroleum Co. 1 D. E. Davis, Sec. 3, Blk. 10, H&TC Sur., 1 mi. S Odell, flowed 177 bbl. oil a day, 16/64-in. choke, Palo Pinto perforated at 4,741-75 ft., casing pressure 400 psi., tubing pressure 100 psi., GOR 500 cu. ft., TD 6,805 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Ray Carson 1 J. R. Parkey, Blk. 38, Dallas CSL Sur., 10 mi. W Archer City, dry, TD 1,544 ft. in sand showing oil.

Steward & Grisham 1 Belle Wisdom, Blk. 123, Jose Ostane Sur., 2 mi. N Archer City, dry, TD 1,438 ft., Thomas sand had estimated 4 bbl. oil a day at 1,160-65 ft.

Clay County: S. D. Johnson 1 T. L. Fields, Blk. 6, Halsell Subd. 2, 5 mi. SW Henrietta, dry, TD 6,548 ft., Caddo 5,769 ft., Ellenburger 6,345 ft.

Cooke County: Broday Drilling Co. 1 J. A. Wylie, Thomas Cook Sur., 1½ mi. NE Era, dry, TD 1,340 ft.

Harvey Oil Co. 1 A. T. Strader, James Taylor Sur., 1 mi. SW Era, dry, TD 1,393 ft.

Hollandsworth Drilling Co. 3 M. J. Usleton, Sec. 19, 4-146, BBB&CRR Sur., 3½ mi. SW Myra, dry, TD 2,075 ft., Ellenburger 2,050 ft.

Fisher County: Humble Oil & Refining Co. 1 Eva E. Boyd, Sec. 3, Blk. K, T&PRR Sur., 7 mi. SE Sylvester, dry, TD 5,539 ft., Ellenburger 5,514 ft., dolomite 5,526 ft., elev. 1,865 ft.

Jack County: Russell Maguire 1 E. B. Abernathie, J. Gates Sur., 9 mi. SE Jacksboro, dry, TD 5,338 ft. in shale and lime.

Seaboard Oil Co. 1 S. E. Moody, Sec. 2, BS&F Sur., 9 mi. SW Bryson, dry, TD 2,210 ft.

Montague County: C. U. Bay 1 Roy Cole, Blk. 69, J. H. Belcher Subd., 2 mi. SE Belcherville, dry, TD 5,542 ft., Strawn sand 5,167-77 ft., conglomerate 5,470 ft.

Russell Maguire 1 W. H. Green, N. S. Ussery Sur., 5 mi. SW Montague, dry, TD 6,505 ft., Caddo 6,260 ft.

B. F. Phillips 1 S. T. Thompkins, Blk. 34, Lge. 11, Calhoun CSL, 1 mi. NW Dyemound, dry, TD 3,580 ft.

R. B. Thrist 1 J. H. Cross "A," Sec. 16, Limestone CSL, ½ mi. S Stoneburg, dry, TD 6,504 ft., conglomerate 6,196 ft., swabbed 1 bbl. oil in 30 minutes from 6,022-80 ft.

Taylor County: Twin Oil Corp. 1 J. W. Harris, T. D. Johnson Sur., 3 mi. NE Abilene, dry, TD 2,140 ft.

Ungren & Frazier 1 W. M. Shaddix, Sec. 14, Blk. 16, T&PRR Sur., 6 mi. NW Abilene, dry, TD 2,602 ft. in lime and shale.

West Central Drilling Co. 1 Farmers Gin, Blk. 24, Lge. 147, Grimes CSL, ½ mi. E Merkel, dry, TD 2,644 ft., Coal 2,626-30 ft., Flippen 2,635 ft., elev. 1,871 ft.

Wichita County: R. Clay Underwood 1 C. H. Van Hor, Sec. 8, Tarrant CSL, 2 mi. NW Iowa Park, dry, TD 2,101 ft. in shale and shells.

Completions in June Increase 21 Per Cent Over Last Year

by Polly De Armond

PRELIMINARY reports for June of the current year show a 21.3 per cent increase in total completions, with a 20.2 per cent increase in oil and gas producers, over the same month of the previous year. There were 3,281 wells drilled, made up of 1,860 oil wells, 222 gas wells and 1,199 dry holes. Total footage was 10,889,772 ft., a gain of more than 1,500,000 ft. compared with the figure for June 1947, and active drilling rigs climbed almost 11 per cent to reach 4,751 for June 1948.

There were increases in all of the depth classifications except that of depths greater than 10,000 ft. A gain of 38.6 per cent was recorded in the 2,500 to 5,000-ft. group, with an increase of 16.5 per cent in the number of wells completed under 2,500 ft., and 10.2 per cent more wells completed in the 5,000 to 10,000-ft. classification.

June vs. June by Areas

Five out of six areas made substantial gains in completions over June of last year, and four reported increases in footage for the comparative period. The greatest gain was noted in the Mid-Continent section of Oklahoma, Kansas, Nebraska and Missouri, which increased 33.3 per cent in wells and 41.3 per cent in footage. The Southern district, including Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida, and Tennessee, gained 55 wells, a 29.4 per cent increase over 1947, with an 8.2 per cent gain in footage. Texas-New Mexico completions were up 27.5 per cent to reach 946 for the month, and footage rose 21.3 per cent for a total of 3,967,314 ft. In the Rocky Mountain region wells increased 16.9 per cent while footage was up 44.5 per cent. The North Central area of Ohio, Indiana, Kentucky, Illinois and Michigan had 603 completions with total footage of 1,356,195 ft. for the month as compared with 477 wells and 1,141,590 ft. in June last year. The Pacific Coast reported a 22.8 per cent gain in completions with a negligible drop in footage drilled, while the Eastern district, including the states of New York, Pennsylvania, West Virginia and Virginia, showed slight decrease in both wells and footage as against last year's figures.

New Record for 1948

The total number of wells in June also represents a new record for completions for 1948, and surpasses May's record of 3,240 by 41 wells. Total footage falls short of the year's 11,012,155-ft. record, set in January, by only 122,383 ft. Thus, the record-breaking trend in completions established for this year continued, with all indications at the midyear point that The Oil and Gas Journal's initial all-time high forecast for 1948, based on operators' estimates, will be more than fulfilled. *(See The Oil and Gas Journal, January 29, page 152, and the coming semiannual issue of July 29.)*

In the comparison between June and May 1948, both the Eastern and Mid-Continent sections reported a 15 per cent increase in completions with comparable footage gains. The Southern states reported an increase of 9 wells with a very small decrease in total footage, and the remaining areas dropped in both categories.

SUMMARY OF COMPLETIONS, JUNE 1948

	Total comp.	Oil	Initial prod.	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	122	61	135	0	61	122	0	0	0	0	170,972	149
Pennsylvania	281	138	304	17	126	213	67	0	1	0	456,728	269
West Virginia	§57	13	471	33	§11	§34	22	1	0	0	138,774	231
Ohio	131	37	1,005	36	58	63	67	1	0	0	312,325	214
Indiana	77	37	5,292	1	39	59	18	0	0	0	156,854	98
Kentucky	66	25	1,217	2	39	57	9	0	0	0	90,279	75
Illinois	236	133	14,584	1	102	95	141	0	0	0	609,430	245
Michigan	93	28	1,798	1	64	63	29	1	0	0	187,307	124
Kansas	335	164	62,888	51	120	47	284	4	0	0	1,068,503	443
Neb., Mo., Iowa	1	0	0	0	1	0	1	0	0	0	4,270	11
Oklahoma	392	226	29,137	17	149	142	164	68	9	9	1,383,934	621
Texas	906	574	89,186	44	288	234	410	173	74	15	3,788,330	1,083
North	160	84	5,656	1	75	88	50	22	0	0	442,008	134
West Central	105	53	4,881	8	44	37	63	5	0	0	310,417	64
West	260	221	57,288	2	37	53	152	31	17	7	1,139,879	206
Panhandle	52	40	2,803	7	5	2	50	0	0	0	157,601	149
Eastern	45	23	4,286	6	16	1	19	15	10	0	255,304	105
Gulf Coast	143	81	9,158	10	52	9	37	53	38	6	884,712	241
Southwest	141	72	5,114	10	59	44	39	47	9	2	598,409	184
Louisiana	193	125	11,376	11	57	95	21	13	36	28	943,712	238
Northern	123	87	5,655	8	28	94	13	7	6	3	330,783	74
Southern	70	38	5,721	3	29	1	8	6	30	25	612,929	164
Arkansas	17	4	324	1	12	4	9	3	1	0	67,739	33
Mississippi	28	21	3,837	0	7	3	3	13	7	5	210,324	58
Ala., Ga., Fla.	¶4	0	0	0	¶4	2	¶1	0	0	1	18,373	12
Montana	20	14	3,860	2	4	9	9	2	0	0	55,387	69
Wyoming	41	30	10,312	1	10	5	27	7	2	0	169,862	185
Colorado-Utah	15	10	1,767	0	5	4	0	11	0	0	73,900	74
New Mexico	40	31	7,171	3	6	5	22	10	2	1	178,984	125
California	226	189	25,752	1	36	86	67	35	32	6	803,785	394
Total June 1948	3,281	†1,860	270,416	222	*1,199	1,342	1,368	342	164	65	10,889,772	‡4,751
Total May 1948	3,240	1,864	251,149	214	1,162	1,358	1,316	327	162	76	10,903,911	4,761
Total June 1947	2,705	1,473	281,343	258	974	1,186	987	459		73	9,191,281	4,291

*Includes 208 service wells: N. Y. 61, Pa. 117, Ohio 8, Ill. 1, Mich. 12, Kans. 1, Okla. 5, No. La. 2, So. La. 1. †Includes 23 distillate wells: Okla. 1, E. Tex. 4, Tex. Gulf 4, SW. Tex. 3, No. La. 2, So. La. 7, Miss. 1, Calif. 1. ‡Includes all wells rigged up and/or drilling at end of month. §Includes 1 Va. comp. ¶Includes 1 Tenn. comp.

STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 17, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1948				
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	28	14	0	*14	35,108	846	806	0	0	0	0	0	0	0	0	0	0
Pennsylvania	48	22	2	†24	79,517	1,454	1,529	0	0	0	0	0	0	0	9	13	22
West Virginia	14	2	8	4	38,623	420	442	0	0	0	1	1	3	0	29	33	65
Ohio	25	6	5	‡14	63,242	724	688	0	0	0	0	0	2	0	8	17	27
Indiana	31	16	2	13	60,963	544	335	0	0	0	1	1	14	0	1*	21	36
Kentucky	18	8	0	10	26,954	357	343	0	0	0	2	2	4	0	0	10	14
Illinois	60	23	0	37	166,465	1,190	1,051	3	0	0	11	14	26	0	1	172	199
Michigan	14	6	3	5	30,713	408	420	1	0	0	4	5	10	0	8	138	156
Kansas	72	35	10	§27	228,850	1,618	1,352	2	0	0	11	13	31	0	4	219	254
Neb., Mo., Iowa	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	1
Oklahoma	88	45	2	¶41	316,906	2,165	2,160	3	0	0	10	13	70	7	16	342	435
Texas	255	168	10	77	1,072,508	6,150	4,737	6	0	2	42	50	171	16	54	1,083	1,324
North Central (Dist. 7-B & 9)	73	36	1	36	219,896	1,888	1,515	1	0	0	17	18	61	0	9	383	453
West (Dist. 7-C & 8)	99	90	0	9	489,884	1,691	1,127	4	0	0	7	11	34	0	2	118	154
Panhandle (Dist. 10)	11	9	2	0	33,265	326	231	0	0	0	0	0	0	0	1	6	7
Eastern (Dist. 5 & 6)	8	4	0	4	36,443	290	270	0	0	0	1	1	5	2	0	66	73
Gulf Coast (Dist. 2 & 3)	27	12	4	11	167,407	969	835	1	0	1	8	10	45	12	12	239	308
Southwest (Dist. 1 & 4)	37	17	3	17	125,613	986	759	0	0	1	9	10	26	2	30	271	329
Louisiana	58	34	4	20	267,993	1,179	717	1	2	0	6	9	24	14	3	115	156
Northern	39	22	3	14	109,002	782	378	1	0	0	5	6	2	1	0	58	61
Southern	19	12	1	6	158,991	397	339	0	2	0	1	3	22	13	3	57	95
Arkansas	12	8	1	3	41,085	158	140	0	0	0	3	3	3	0	0	47	50
Mississippi	14	8	0	6	116,035	214	255	0	0	0	5	5	2	0	3	46	51
Southeastern States	1	0	0	1	4,444	26	25	0	0	0	1	1	0	0	0	24	24
Montana	6	4	1	1	15,603	140	125	0	0	0	0	0	2	0	0	9	11
Wyoming	7	3	0	4	29,708	245	112	0	0	0	0	0	15	0	1	24	40
Colorado-Utah	3	0	0	3	8,817	132	101	0	0	0	3	3	0	0	2	26	28
New Mexico	12	9	0	3	54,982	338	272	0	0	0	3	3	4	1	1	26	32
California	56	51	1	4	160,513	1,554	1,082	7	0	1	2	10	54	0	2	156	212
Total United States	822	462	49	311	2,819,029	19,864	16,694	23	2	3	105	133	435	38	142	2,522	3,137
Total previous week	740	398	59	283	2,599,671	19,042	16,014	25	0	4	91	120	412	36	139	2,417	3,004
Total July 19, 1947	680	330	62	238	2,293,574			14	1	6	85	106	353	43	102	2,069	2,567

Service wells included: *14, †23, ‡4, §1, ¶3.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.36	2.20
25-25.9	2.38	2.35	2.38	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED JULY 10

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	917	2,439	375	1,216	1,591	25,484	8,383	15,349	10,360
Appalachian:									
District 1	109	280	37	92	77	2,084	396	490	375
District 2	58	194	8	47	89	832	98	158	105
Ind., Ill., Ky.	945	3,673	343	1,003	1,090	21,436	3,346	6,875	4,932
Okla., Kans., Mo.	459	1,617	112	666	514	8,800	1,199	3,933	1,918
Inland Texas	232	1,033	72	178	405	3,210	745	633	807
Texas Gulf Coast	1,473	4,374	606	2,322	2,030	15,118	2,147	6,296	6,276
La. Gulf Coast	443	1,389	302	592	501	4,972	1,334	3,290	1,549
N. La. and Ark.	93	231	53	105	153	2,227	506	403	279
Rocky Mountain:									
New Mexico	10	35	7	9	24	70	25	24	28
Other Rocky Mtn.	152	466	41	177	174	2,636	204	1,011	968
California	900	2,513	67	1,031	2,493	16,049	852	12,146	34,788
July 10, 1948	5,791	18,244	2,023	7,438	9,141	102,948	19,235	50,608	62,385
July 3, 1948	5,701	18,041	2,116	7,185	9,055	104,145	18,733	47,538	60,926
July 12, 1947	5,268	16,255	2,213	6,004	8,666	87,930	16,162	42,899	50,596

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 219,740,000 bbl. as of July 10—down 3,968,000 bbl. One year ago 232,361,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

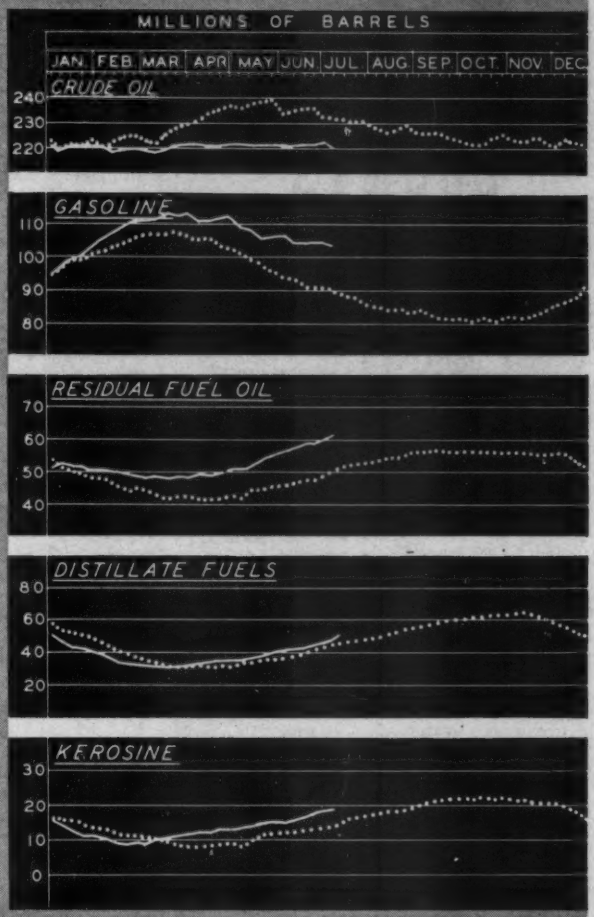
	July 17 crude oil	B. of M. July demand	July 10 crude oil
Alabama	1,300	1,500	1,210
Arkansas	82,165	88,000	81,710
California	948,300	950,000	948,750
Colorado	44,730	50,000	46,590
Eastern	63,450	66,000	64,700
Florida	825	800	825
Illinois	170,400	173,000	170,800
Indiana	21,000	16,000	20,200
Kansas	300,350	304,000	295,000
Kentucky	24,600	25,000	23,200
Louisiana	476,450	492,000	476,050
North Louisiana	113,350	.....	112,950
South Louisiana	363,100	.....	363,100
Michigan	43,700	46,000	44,850
Mississippi	119,740	125,000	118,520
Montana	25,940	26,000	24,890
Nebraska	400	700	400
New Mexico	128,920	138,000	128,900
Oklahoma	423,450	432,000	428,150
Texas	2,415,475	2,540,000	2,452,500
Dist. 1 (Southwest)	29,050	.....	28,625
Dist. 2 (Southwest)	178,400	.....	175,175
Dist. 4 (Southwest)	246,950	.....	252,500
Dist. 3 (Gulf Coast)	489,950	.....	493,100
Dist. 5 (Eastern)	48,600	.....	47,925
Dist. 6 (Eastern)	121,500	.....	120,250
East Texas Field	303,000	.....	303,000
Dist. 7-C (West)	42,725	.....	42,725
Dist. 8 (West)	684,100	.....	706,950
Dist. 7-B (W. Central)	49,300	.....	49,500
Dist. 9 (N. Central)	133,700	.....	142,350
Dist. 10 (Panhandle)	88,200	.....	90,400
Wyoming	148,680	156,000	148,210
Total United States	*5,439,875	5,630,000	5,475,455
Change from prev. wk., dn.	35,580		

Total production January 1-July 17..... †1,087,519,415 bbl.
Same period last year (crude plus cond.) 976,603,070 bbl.

*Not incl. 72,580 bbl. condensate. †Incl. 14,813,240 bbl. condensate.

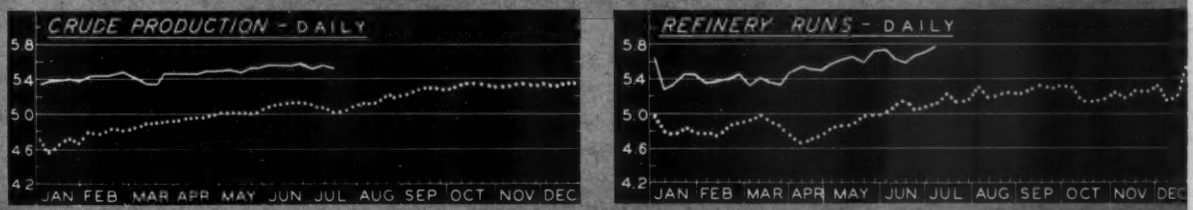
STOCKS IN UNITED STATES

---- 1947 ——— 1948



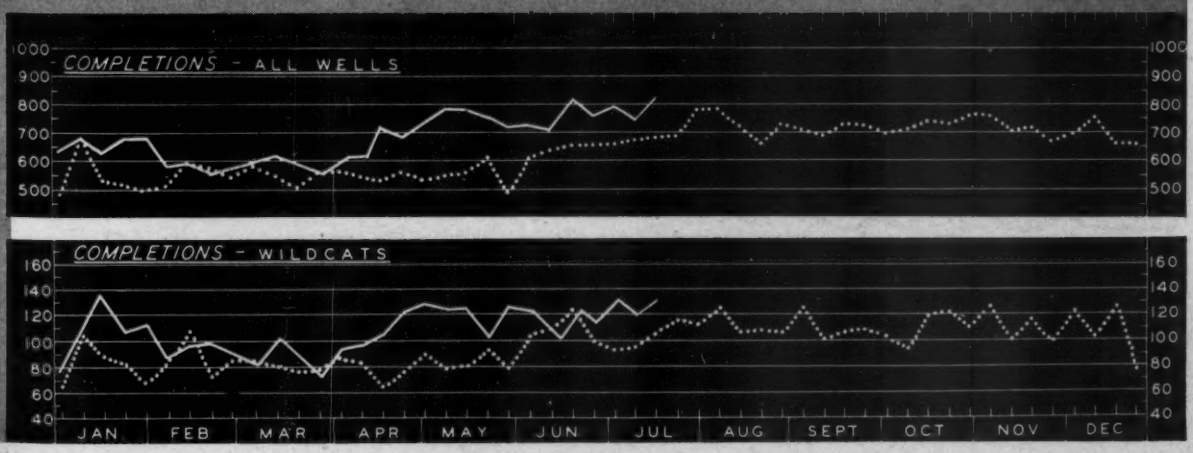
DAILY OPERATIONS

---- 1947 ——— 1948



WEEKLY COMPLETIONS

---- 1947 ——— 1948



FOR FULLY AUTOMATIC CONTROL OF ALL WATER TREATMENT PROCESSES

EXPERIENCE COUNTS

• Panel designed for fully automatic control of Belco Softener, Alkalinity Remover and Deaerator in large process industry.

• Eleven alternate process cycles are precision controlled with this unit.

Belco engineers are thoroughly experienced in all phases of completely automatic water treatments. By applying this wide experience to your processes you can avoid the losses that result from outdated control — you can reap the savings that result from modern simplified automatic Belco control. Experience counts . . . Belco has, for example, the advantage gained through designing and building the worlds largest fully automatic demineralization and silica removal plant.

MODERNIZATION OF EXISTING PLANTS RESULTS IN LARGE OPERATING SAVINGS

Ask a Belco engineer how modernization might effect substantial savings in your present operations. Ask about the application of the Belco automatic controls to other processes in your plants.

BELCO INDUSTRIAL EQUIPMENT DIVISION, INC.
50 Iowa Avenue Paterson 3, N. J.
In midwest: Deady Chemical Co., Kansas City, Mo.
In southwest: Watermasters, Inc., Houston, Tex.
In Pacific: Deady Chemical Co., Los Angeles, Cal.

Belco

PROCESSES FOR REMOVAL OF WATER IMPURITIES

MARKETS

ON the Gulf Coast last week the spot market in petroleum products continued weak. The belief that the continued slowness in open noncontract trading was the result of an over-all improvement in petroleum supply generally. Backing up this contention were reports showing that stocks of motor fuel are about 15,000,000 bbl. greater than a year ago and that gasoline production is now running at a rate about 2,000,000 bbl. greater weekly than last year.

One marketer said there are indications some major suppliers are relaxing allocation restrictions which in some cases hold dealers to 80 per cent of last year's consumption.

Heavy-Fuel Prices Down

In the Houston area, it was reported the $3.25 previously asked for heavy fuel oil for water shipment had been dropped to $2.90 and that material was moving at about $2.80. The interior market was said to be ranging around $2.15. Motor fuel was reported moving at 12½ cents per gallon for housebrand, tank car, and about a cent higher for water shipment.

Price increases averaging generally 0.2 to 0.4 cent per gallon on gasoline, kerosine, No. 2 oil, and diesel fuel at main points throughout New York and New England were announced last week by Socony-Vacuum Oil Co., Inc. The price hike reflected increased transportation charges and higher wages, company officials said. One major and one independent confirmed that they would meet the price advance of Socony while indications were that most others would follow later.

In New York tank car and barge prices of No. 2 oil were raised 0.2 cent to 9.6 cents and 9.5 cents, respectively. At Rochester, N. Y., and Springfield, Mass., tank-car prices of No. 2 oil was raised 0.1 cent per gallon. Kerosine margins were apparently left generally unchanged in the new price setup except at New York where tank-car prices were raised 0.2 to 10.6 cents and tank wagon 0.3 to 14.5 cents.

Demand for motor fuel in the Mid-Continent area continued strong and movements were at more normal price levels according to marketers. High premiums that were previously being asked by some quarters in the past are failing to draw out purchasers for their material. One Oklahoma supplier who purchased several cars of housebrand gasoline f.o.b. North Texas, at 12¼ cents per gallon, said that that price represented what he found to be the higher level for spot-market material.

Mid-Continent Demand Is Firm

All petroleum products in the Mid-Continent area continued to be relatively firm in demand with the exception of No. 6. Although the price level of this material has dropped more than any of the other products in recent weeks suppliers are not dumping it on the market. Movements continued last week around $2.35 at the low while little was moving above this price. With the anticipation of a stronger demand for No. 6 within the next 60 days or so refiners are expected to hold on to any surplus.

With spot-market material loosening up and price levels for nearly all products easing away from the higher levels a much more "healthier situation" exists on the market today as compared to the condition in recent weeks, explained one marketer.

Kerosine, according to one supplier, is a little difficult to find, but no change in the price level for this product has been noted and movements continue active.

Representative Quotations

Representative spot-market quotations of leading suppliers as of July 19, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10½-12	11.6-12* 10.5-11.9†	10.9-12½
Premium gasoline, 78-80 octane	11½-13	10.6-13.4	12.9-13¼
42-44 w.w. kerosine	9½-10	10.3-11.9	10¼-10½
No. 2 straw fuel oil	9-9½	9.4-10.9	9.05-10
No. 6 residual	$2.35-2.50	$3.03-3.90	$2.35-2.65

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12-14.5
750 vis. No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-21

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	30-31

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	45

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	6¾-7

EQUIPMENT MEN ... in the News

Cathodic Protection Appoints Wheeler

Roger M. Wheeler has been appointed manager of the Mid-Continent area for Cathodic Protection Service, Houston. He will make his offices in Tulsa.

Prior to joining Cathodic Protection Service, Wheeler was in the pipe-line department of Sohio Oil Co. at St. Louis. He will handle sales and services throughout the Mid-Continent.

Layne-Texas Co. Announces Office Removal

Layne-Texas Co., Ltd., has moved its North Texas office to 6419 Maple Avenue, Dallas. The new headquarters has spacious air-conditioned offices with complete warehousing facilities.

Service offered by the company includes the sale and engineering application of water-treatment equipment.

Oil Well Promotes Jones

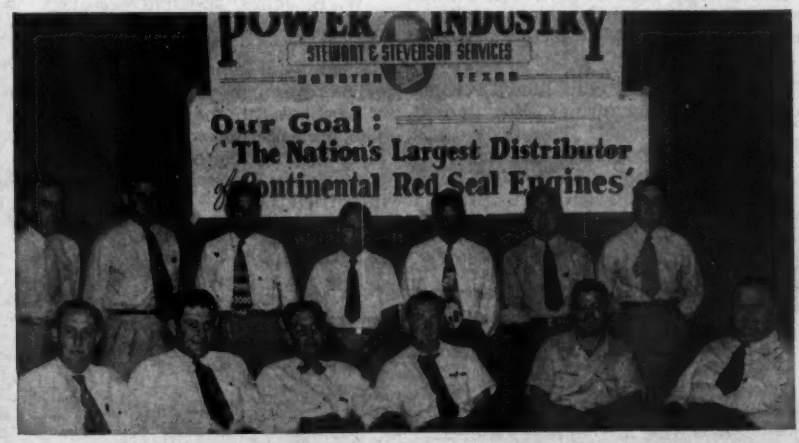
Lloyd E. Tracy, vice president-sales, for Oil Well Supply Co., announces the appointment of Melvin F. Jones as general sales staff manager for this U. S. Steel subsidiary, whose headquarters is at Dallas.

Jones, Oilwell's assistant treasurer for the past 5½ years, began his service with the company in 1929, and was with the accounting department at Pittsburgh, and Oil City, Pa., until 1935 when he was transferred to the accounting department at the Dallas headquarters. In 1939, he moved to Los Angeles as division auditor for the California division and returned to Dallas as assistant treasurer in January 1943.

Stewart & Stevenson Holds Sales Meeting

At a sales meeting held in Houston late last month, Joe Manning, general manager of Stewart & Stevenson Services, announced that this company was (1) starting a concentrated drive to make Stewart & Stevenson Services the nation's largest distributor of Continental Red Seal Engines, (2) announced Stewart & Stevenson's appointment as Texas distributor of Packard marine engines, and (3) announced the manufacture of a new Stewart & Stevenson overhead irrigation system.

Highlight of the meeting was the plan to make Stewart & Stevenson the nation's largest distributor of Continental Red Seal Engines. The plan is outlined along the same lines as that used to make Stewart & Stevenson the nation's largest distributor of GM Diesel Engines—a position they now hold. Essentially the plan is built around engineered installations, guaranteed performance and super service.

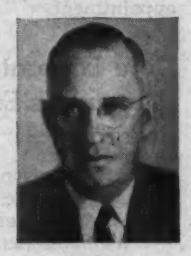


Attending Stewart & Stevenson recent sales meeting were, left to right, front row: H. A. Trotter, Houston sales; L. L. Howell, Wichita Falls branch; J. C. Brown, McAllen branch; Joe Manning, Houston; Fred Malley, Livingston sales representative; W. B. Muse, Dallas. Back row: Emmett Dobbs, Houston; F. W. Smith, Dallas; Bob Mitchell, Houston; R. N. Conolly, Corpus Christi; A. B. (Dick) Grant, Laredo; Charles T. Ames, Houston; J. C. Manning, Houston. Also present at the meeting but not shown in the photograph: C. L. Ward, Dallas; N. N. Elkins, Corpus Christi; Bill Collett, McAllen; Dick Morrison, Beaumont; and E. E. Childress, Houston

Barnes Appoints Ford and Reynolds

W. M. Barnes, president of W. M. Barnes Co., engineers and contractors, Los Angeles, has announced the elec-

J. E. FORD, JR.



J. S. REYNOLDS

tion of John E. Ford, Jr., as vice president in charge of engineering and sales, and J. S. (Steve) Reynolds, as vice president in charge of construction, Both men are members of the board of directors of the Barnes company and will headquarter in Los Angeles.

John Ford was formerly manager of commercial development for Houdry Process Corp. and a member of its board of directors; Steve Reynolds, long-time Kellogg construction engineer, organized Wilmington Construction Co., now owned by W. M. Barnes Co.

Personnel Changes in Oil Well Supply

M. E. Nicklin, manager of Oil Well Supply Co.'s export division since March 1940, has been appointed manager of sales for the company's Witte Engine Works division at Kansas City. M. E. Keenan, assistant manager of the export division, which has headquarters at New York City, was named to succeed Nicklin.

Kenton Chickering, supervisor of the market-analysis section since October 1944, has been named manager of the commercial research section. A 20-year employe, Chickering has been in the general sales department at the company's headquarters in Dallas for the past 15 years.

D. O. Smith, a veteran of 24 years with Oilwell, was appointed manager of the product development and improvement section. He has been supervisor of the training section since coming to the general sales staff in June 1945.

R. L. Humphrey, tubular representative in Oil Well Supply Co.'s Gulf Coast division headquarters at Hous-

ton since September 1947, has transferred to Dallas as manager of the personnel and training section.

J. E. Shoemake has been named manager of refinery and pipe-line equipment sales for Oil Well's Gulf Coast division.

Frederick L. Wilkinson has been appointed manager of the Long Beach, Calif., store of Oil Well Supply Co. Wilkinson, a naval veteran of World War II, became connected with Oilwell in September 1946, serving as division warehouseman at Los Angeles and as storeman in the Bakersfield and Long Beach stores before his new appointment.

Core Laboratories Announces Expansion Program

W. H. Davison, president of Core Laboratories, Inc., nation-wide petroleum-reservoir engineering company which maintains general offices in Dallas, revealed plans for the construction and improvement of over $250,000 worth of portable field-laboratory equipment to be used in core-analysis and drilling-cuttings-analysis work, and subsequent petroleum-reservoir-engineering studies. Some of the new equipment has been designed especially for use on offshore locations. This will be accomplished by setting a completely unitized laboratory on the drilling company's operating barge.

New stationary labs have been established at Abilene and Midland, the latter location being especially equipped for making complete analysis of fractured lime. Other installations which have moved into new and enlarged quarters and will serve as both permanent labs and base points for portable field units used in core-analysis and drill-cuttings-analysis work include Lafayette, La.; Corpus Christi and Tyler, Tex.; and Oklahoma City.

Davison also announced an employe profit-sharing plan which provides a bonus arrangement of a large fixed percentage of the organization's net profits, before taxes.

Johnstons Form New Companies

BLAINE JOHNSTON

M. O. Johnston, prominent California oil-tool manufacturer of Los Angeles and pioneer of gun perforation, has joined forces with Edgar Johnston, of Longview, Tex., well-known Texas oil operator and contractor, in the formation of the Johnston Enterprises, a Johnston family business which links Mid-Continent and California interests. M. O. Johnston is president; Blaine Johnston is general manager; and the other owners are M. O. Johnston, Jr., Warren Johnston, E. C. Johnston, Jr., Gordon Johnston, and Glenn Johnston.

Johnston Enterprises controls the patents and manufacturing rights of the new Hydra-Line principle. This revolutionary new development departs from conventional means of hoisting operations by combining hydraulics with the wire line. The company headquarters is at 3035 Andrita Street, Los Angeles, and the manufacturing plant is located at Longview.

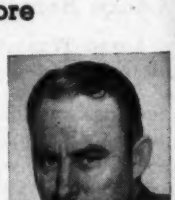
The Hydra-Line Division, with headquarters at 3035 Andrita Street, Los Angeles, has been formed for the purpose of making Hydra-Line applications for the oil industry. Its first product is the Mason Hydra-Line rig which eliminates draw works and traveling blocks on heavy-duty deep-well drilling rigs, fully portable and semiportable drilling and workover rigs, light portable pulling and shallow drilling rigs, combination pumping and pulling units. Other Hydra-Line oil-field applications are planned.

Blaine Johnston, Jr., is also general manager of the Hydra-Line Division. He received his formal education at Southern Methodist University and University of Southern California, receiving a degree in mechanical engineering from the latter institution. Prior to the war he had 5 years' experience with Johnston formation testers in domestic and export sales work. More recently, he was in International Derrick Co.'s export, sales engineering and technical service specializing in portable rigs. During this period he traveled extensively in South America.

Behrends Joins Taylor Forge & Pipe

E. (Ed) L. Behrends has joined the general sales department of Taylor Forge & Pipe Works which operates plants at Chicago and Carnegie, Pa. He formerly was vice president of George B. Limbert Co., and later became manager of the Western Supply Division of Lummus Co. operating the former Limbert facilities.

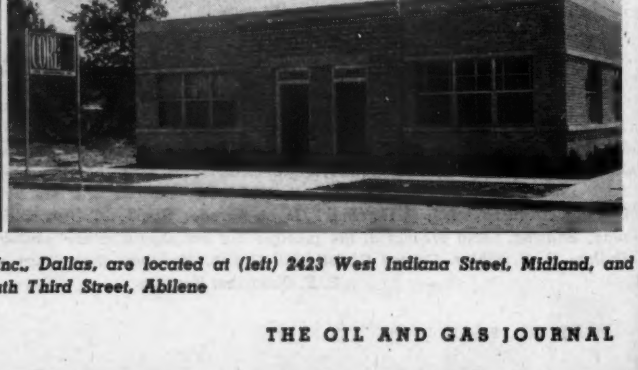
Johnson Joins Manning, Maxwell & Moore



C. F. "Cy" Johnson has recently joined Manning, Maxwell & Moore, Inc., whose main offices are in Bridgeport, Conn., Johnson will have his office at 1909 Marshall Street, Houston, and will function as special representative. He will also contact all phases of the oil industry with special emphasis on broadening the usefulness of the company's products in that industry, and with a view to adding to these products.

Jones Retires from TESCO

W. B. Jones, assistant secretary of Texas Electric Steel Casting Co., was recently presented a gold watch at a Ramada Club luncheon given in honor of his retirement after nearly 20 years of service with the Houston foundry. The presentation was made by T. H. Shartle, president of TESCO, before a gathering of Texas Electric Steel Casting officials.



New permanent laboratories established by Core Laboratories, Inc., Dallas, are located at (left) 2423 West Indiana Street, Midland, and (right) 1063 South Third Street, Abilene

Garratt Joins Goodall Sales Force

John N. Garratt has joined the sales force of Goodall Rubber Co. as special representative in charge of promoting Flexo rotary hose sales. Garratt received his B.S. degree in civil engineering from Newark College of Engineering. He pursued further studies in sanitary engineering at Massachusetts Institute of Technology. From 1938 to 1948 he was associated with Wallace & Tiernan, Inc., as sales engineer for the Gulf Coast territory. He also served as major in the engineering corps of the U. S. Army during this period.

Consolidated Steel Changes Name

Representing a change in name only, Consolidated Steel Corp. will conduct its business under the new corporate name of Consolidated Western Steel Corp., according to an announcement by Alden G. Roach, president.

Western Pipe & Steel Co. of California, and The Steel Tank & Pipe Co., both of which have been wholly owned subsidiaries of Consolidated Steel, will henceforth be operated as units of Consolidated Western. Consolidated Steel Corp. of Texas will continue to operate as a separate corporation, under its own name, in Texas and other states.

Bucyrus-Erie Appoints Canadian Distributor

Appointment of Tillsonburg Pipe & Supply Co., Tillsonburg, Ont., Canada, as distributors for Bucyrus-Erie oil-well spudders, was recently announced by Bucyrus-Erie Co., South Milwaukee, Wis.

Tube Turns Elects Seiler

John G. Seiler has been elected executive vice president of Tube Turns, Inc., Louisville.

Seiler, who is a native of Louisville, became associated with Tube Turns, Inc., on February 24, 1930. A year later he was appointed sales manager. He was made vice president at the beginning of World War II, and general sales manager on February 14, 1945.

Seiler is a member of the executive board of the American Supply & Machinery Manufacturers' Association; and a member of the American Welding Society, Drop Forgings Association, Army Ordnance Association, International Acetylene Association, American Standards Association, and American Society for Metals.

Kelley on South American Trip

Lawrence J. Kelley with Hillman-Kelley (oil well supplies) with offices in Los Angeles and Houston, is on a 4-month trip through Venezuela, Trinidad, and Colombia, spending the major portion of his time in Venezuela.

Murphy Named Southwest Distributor

C. B. Murphy, widely known diesel sales engineer, has been appointed by Lima-Hamilton Corp. to represent the firm in the sale of diesel engines and power engineering equipment in the Southwest.

With headquarters at 3130 Daniels Street, Dallas, Murphy will represent Lima-Hamilton in covering all power projects, including oil fields and pipeline work, in the Southwest.

MacPherson Joins Thermoid

A. Ray MacPherson has joined Thermoid Co., Trenton, N. J., as manager of its industrial friction materials sales division.

Prior to joining Thermoid, MacPherson was sales manager of Standco Brake Lining Co. of Houston.

Prior to that he was associated with Raybestos-Manhattan for many years in various capacities. He has spent most of his adult life in the brake lining business.

MacPherson will make his headquarters in Detroit.

Rinelli to Handle Ansul Advertising

William R. Rinelli has been appointed director of Ansul Chemical Co.'s new customer-relations department. This department will correlate the company's advertising, publicity, sales promotion, and marketing.

Edward Valves Constructs New Laboratories

Construction has been started on a new building to house the metallurgical, physical, and chemical laboratories of Edward Valves, Inc., East Chicago, Ind., a subsidiary of Rockwell Manufacturing Co. The facilities will be used for research and development work on Edward and Nordstrom steel valves.

Paschall Heads Mississippi Division

H. C. Smith Oil Tool Co. recently has announced that Hearn J. Paschall has been named manager of Mississippi for the firm. The company's headquarters will be located at 709 Orleans Street, Natchez. Paschall has been associated with the company for the past 10 years and until recently was branch manager in Santa Maria, Calif.

Halliburton to Construct Cement Plant

Plans for the immediate construction of a $6,000,000 plant in Corpus Christi to produce 16,000 sacks of cement daily have been announced by Erle P. Halliburton.

Halliburton, who is head of Halliburton Oil Well Cementing Co., said that the plant will be owned by himself and Vida C. Halliburton and will be operated by Tex-Mex Cement Co. under a lease agreement. It will be located on the Corpus Christi turning basin.

The plant will produce construction cement and two types of cement for use in oil-well work. Raw materials will be oyster shells and clay from Nueces Bay. The plant is expected to be in operation in less than a year.

Murdock Appointed Tulsa Distributor

Appointment of F. L. Murdock & Co., Tulsa, to handle the Hewitt Rubber Division line as industrial and oil-field distributors of hose, conveyor, transmission belting, and packing is announced by J. H. Hayden, vice president in charge of sales, Hewitt-Robins, Inc.

F. L. Murdock is president of the Tulsa concern. Frank Monahans and Russell Jones are sales representatives.

Shultz to Head Corrosion Engineering Department

Natasco Co., Tulsa, announces that Sam T. Shultz has been placed in charge of the company's corrosion-engineering department. Shultz was associated with The Texas Co. refinery, Port Arthur, Tex., as paint chemist for 17 years and prior to that was with E. I. du Pont de Nemours & Co., Inc.

Shultz will headquarter in Houston in order to serve the Gulf Coast area.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Wilson Master Model Winch powered by 6 MZR Waukesha engine. Unit mounted on one and one-half ton Chevrolet truck equipped with fifty foot single pole telescoping mast. Terms. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: 7500′ Rotary rig complete with 6900′ good 4½″ O.D. drill pipe. S. E. Frogge, Box 4455, Oklahoma City, Oklahoma.

FOR SALE: 30′ x 136′ 962,000# Capacity IDECO No. 9136 Galvanized Derrick with 7′—3″ High, 1,000,000# Capacity Galvanized Sub-Structure. **Lucey Products Corporation**, Tulsa, Oklahoma.

STEEL TANKS IN STOCK

14 New Bolted 10,000, 3,000 & 1,000 Bbl. cap., at New York & New Orleans.

6 New 30,000 Gal. & 4 New 15,000 Gal. 250 lb. pres. A.S.M.E. propane.

DARIEN CORP.
60 E. 42nd St., New York 17, N. Y.

REINFORCING RODS

500 tons ..... ¾″ sucker rods
40 tons ..... 1″ sucker rods

$80 per ton, FOB cars

T & T TOOL COMPANY
317 East Third Street, Tulsa, Oklahoma

FOR SALE

Martin Decker Slim Hole Weight Indicator, Reconditioned. New $300. Ours $125.
1¼ Centrifugal pumps, 1½ HP, 220-440, 3 phase, 3600 RPM, ball bearing. Reconditioned. Allis-Chalmers, New $148. Ours $75.
Chemico Demineralizing Unit. Used. Steal at $150.
5 HP pump, 1750 RPM, 3″. Used. $125.
4 x 6 Union steam pump, 125 lb., 10 HP Fairbanks engine and clutch on skids. Used. $250.
2 x 3 250 lb. Gardner pump with 3 HP Fairbanks engine and clutch on skid. Used. $125.

D & M SALES CO.
911 E. Independence, Tulsa, Okla.

EQUIPMENT FOR SALE

FOR SALE: New Welded Steel Tanks, New Bolted Steel Tanks—100 bbl., 250 bbl., 500 bbl., 1000 bbl., 2—10,000 bbl. Used Bolted Tanks—65 bbl., 100 bbl., 250 bbl. up to 5,000 bbl. Gasoline tanks, 3-10′ x 50′ 4-10′ x 35′, 6-7′ x 30′. Also Tool Houses, new or used. Write: Independent Tank Company, Seminole, Oklahoma. Phone 977.

OIL WELL CASING, new, 5½ and 7″, J-55, seamless casing available on 12-month contract basis. Early delivery. Also cold drawn seamless tubing in IPS sizes from ⅛″ to 1½″ direct from mill. Write, wire, phone. Invention & Research, 5921 Troost, Mr. Chapman, Kansas City, Missouri. Delmer 4225.

FOR SALE: Bucyrus-Erie 24-L Trailer mounted spudder with casing reel, clutch driven sand reel, cat heads complete with cables and 6″, 8″ and 10″ Tools, joints 3¾ and 4¼. Water pump, light plant, set sectional A shear poles with blocks. $6500.00 Cash F.O.B. Princeton, Indiana. A. H. Bigler, Phones 219 or 494.

FOR SALE
2—74,000 BBL. CAP.
STEEL STORAGE TANKS
DARIEN CORP.
60 E. 42nd St., New York 17, N. Y.

FOR SALE

12—330 H.P. Type 10 Bessemer New 17″ Power Cylinders complete ready to run with 16″ to 18″ Compressors. 1—330 H.P Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

FOR SALE
DIESELS and PUMPS

Six new 1947 unused 475 BHP 8 cylinder Baldwin Model VG Diesel Engines, four connected to Ingersol-Rand Multi-stage Centrifugal Pumps with Farrel-Birmingham Step-up Gears and two connected to Worthington Horizontal Triplex Double Acting Pumps, all units complete with Falk Couplings, Lummus Coolers, other accessories. Location Ohio, immediate delivery. Direct inquiries to

THE BUCKEYE PIPE LINE COMPANY
Joseph Steele, Purchasing Agent,
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New York 4, N. Y.

WE BUY and SELL

Steel Pipe and Tubing
Pipe Fittings—Well Casing
Culverts and Valves

SONKEN-GALAMBA CORP.

2nd & Riverview, Kansas City 10, Kans.

EQUIPMENT FOR SALE

FOR SALE: 7500′ of 6⅝″ O.D. 20 lb. casing, long couplings, 3″ taper thread, smooth inside and out. Price $3.00. M. J. Regan, Coffeyville, Kansas.

FAILING 44, on 42-V8, new radiator, new motor, new drill rod. Drill in good condition. Fred E. Butler, 1013 South Cedar, Casper, Wyoming.

45 ST Star Spudder, without tools and line, with 120 hp. Hercules engine. Machine in excellent shape. Travco Equipment Co., 110 Midco Bldg., Tulsa. 5-2251.

SLUSH pump. Wheatley 6 x 6 with 4½″ liners, Mission equipped. V-belted to 25 H.P. gas-gasoline Waukesha engine. Box 127, Little Rock, Arkansas.

FOR SALE: #2A National Machine, complete string of tools, 15 inches down, shear poles, Young engine, Wis. Light Plant. Good condition. Write or phone R. M. Rodgers, Quinton, Oklahoma.

PARTS FOR ARMY TRUCKS

New and Used

Largest stock in America, 6x8, 6x4, 4x4, 4x2. All items guaranteed. Largest auto wrecking house in the west with most complete stock of new and reconditioned parts for all cars and trucks. New jeep power units complete with radiators and stub shafts. Fast service.

PIONEER AUTO WRECKING CO.
732 W. 13th Ave. Denver 17, Colo.

AVAILABLE FOR IMMEDIATE DELIVERY

Several
No. 22W—24L

Bucyrus-Erie Spudders

Contact

Iverson Supply Company

Artesia, New Mexico, Odessa, Tex.,
or
Tulsa, Oklahoma

1000 KW
GAS ENGINE GENERATING PLANT

Now in use—available September 1st.
2 Clark Model RA-8—875 HP—327 RPM Vertical Angle "Super 2" Two Cycle 8 cylinders 14″ x 14″ Gas Engines.
Direct connected to two 625 KVA, 500 KW, 327 RPM, 2300 Volt, Westinghouse Generators—Belted Exciters, Dead Front Switchboard Heat Exchangers, Air Cleaner, Circulating Pumps.

WEIGHT EACH—78,400 LBS.

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